



ENVIRONMENTAL PROSPERITY GAME

PLAYERS' HANDBOOK

March 29-31, 1995

**sponsored by the
Silicon Valley Environmental Partnership**

**co-sponsors:
Joint Venture: Silicon Valley Network
Alameda Economic Development Advisory Board
Bay Area Economic Forum**

**hosted by
Pacific Gas & Electric Co. Learning Center
San Ramon, California**

**produced by
Sandia National Laboratories
Lawrence Livermore National Laboratory**

**ENVIRONMENTAL PROSPERITY GAME
PLAYERS' HANDBOOK
March 29-31, 1995**

CALVIN THREADGILL

This 1995 Prosperity Game is dedicated to the memory of our friend and colleague, Calvin Threadgill, vice president of marketing for Zapit Technologies Corporation, who was struck and killed by a car while crossing the Embarcadero in San Francisco this past summer.

Calvin was a native Texan, proud and straight-backed with always the twinkle of a smile in his eyes. But Texan though he was, Calvin loved the oceans and mountains of California which he explored as a scuba diver and instructor, an ocean kayaker and a hiker.

It was his enthusiasm for California's rugged side which drove Calvin's interest in the environmental business and which spawned the energy which infused his work at Zapit, Titan Beta, and projects with the Silicon Valley Environmental Partnership.

It is his enthusiasm for and commitment to the promotion of a cleaner, healthier environment that is Calvin's legacy to those of us who continue in this most important work.

NOTICE: The Government has granted for itself and others acting on its behalf a paid-up, nonexclusive, irrevocable worldwide license in these data to reproduce, prepare derivative works, and perform publicly and display publicly.

Neither the United States nor the United States Department of Energy, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights.

Copyright, 1994, 1995, Sandia National Laboratories

TABLE OF CONTENTS

INTRODUCTION	1
GOALS OF THESE GAMES	1
GAME CONCEPT	2
TEAMS	2
PLAYERS	2
GAME OBJECTIVE	2
Blue Teams	3
Green Teams	3
Yellow Team	5
Purple Team	5
Red Teams	6
Team Goals	8
KARMA KARDS	10
RULES OF PLAY	12
BLUE TEAM SCENARIOS	15
BLUE TEAM 1: RESTORE, INC.	15
BLUE TEAM 2: BABCO	20
BLUE TEAM 3: ROCAR - BIG OIL AND CLOHI	25
BLUE TEAM 4: CUTS - BEHEMOTH AND ELECTRA	31
SUGGESTED EXAMPLES FOR GREEN TEAM REQUIREMENTS	38
APPENDIX A - LIST OF PLAYERS	43
APPENDIX B - GAME SCHEDULE	50
APPENDIX C - SAMPLE BALANCE SHEET	54
APPENDIX D - BLUE TEAM BALANCE SHEETS	55
APPENDIX E - REQUIREMENT COMPLETION FORM	56
APPENDIX F - AGREEMENT FORM	57
APPENDIX G - FORM FOR RECORDING COURT DECISIONS	58
APPENDIX H - BUSINESS PLAN FOR USE WITH FINANCE	59
APPENDIX I - ENVIRONMENTAL BACKGROUND INFORMATION	60
BRIEF HISTORY OF MAJOR US ENVIRONMENTAL LAW	63
PERMITS NECESSARY FOR LANDFILLS IN CALIFORNIA	65
TECHNOLOGY CERTIFICATION IN CALIFORNIA	66
APPENDIX J - GLOSSARY OF TERMS	67

ENVIRONMENTAL PROSPERITY GAME

PLAYERS' HANDBOOK

March 29-31, 1995

INTRODUCTION

Prosperity Games are an outgrowth of move/countermove and seminar war games. They are executive-level interactive simulations that explore complex issues in a variety of economic, political and social arenas. The simulations are high-level exercises of discretion, judgment, planning and negotiating skills, not computer games. They explore the problems and opportunities faced by businesses, government, laboratories, universities and the public.

Seven previous Prosperity Games have explored environmental issues and economic competitiveness in electronics manufacturing. This is the first full game to focus on environmental technologies. Given our shared commitment to both sustainable economic development and protection of the environment, a guiding principle for our economy must include the development and use of new environmental technologies.

Environmental technologies represent a complex and atypical market; entrepreneurs face many technical, financial, regulatory, and business hurdles. The unique value of this game is that, in a very short period of time and in a simulated setting, you will be able to experience the complex interplay of all the business, regulatory and public forces involved in taking an environmental technology to market.

The game will include four entrepreneurial teams ("Blue Teams") attempting to launch their environmental technologies into the 21st century. Three "Green Teams" will represent US, state and regional environmental regulators, environmental activists, and members of the public. Other teams will represent suppliers, customers, judges, lawyers, legislators, the news media, venture capitalists, and banks.

GOALS OF THESE GAMES

SPECIFIC:

Investigate strategies for developing multi-agency (national/state/regional), one-stop regulatory approval process for certifying and implementing environmental technologies and evaluating the simulated results.

Identify the regulatory hurdles and requirements, and the best approaches for surmounting them.

Identify technical problems and potential resources (environmental consultants, labs, universities) for solving them.

GENERAL:

Develop partnerships, teamwork, and a spirit of cooperation among environmental entrepreneurs, regulatory agencies, users of environmental technology, environmentalists, the public, and the media.

Increase awareness of the needs, desires and motivations of the six different groups.
Bring conflict into the open and manage it productively.
Explore long-term strategies and policies.
Provide input for possible future legislation.
Provide a learning experience.

GAME CONCEPT

TEAMS:

The game involves thirteen basic teams:

Four Blue (entrepreneurial/business) Teams.

Three Green (environmental) TeamsUS, state, and regional environmental regulators; the "public" (citizens' advisory groups, interested individuals); and environmentalist groups.

One Purple (customer) Teamrepresenting potential customers for the Blue Teams including businesses, military bases, DOE waste sites, manufacturing industries, municipal sewage and solid waste departments, or any other potential user of the environmental technology/product.

One Yellow (supplier) Teamrepresenting private environmental consultants, national laboratories and universities.

Four Red Teams representing:1) the legal system (judges/lawyers acting as mediators, judges, attorneys, legal consultants, lobbyists, etc); 2) bankers and venture capitalists to help finance the entrepreneurs and customers; 3) the news media; and 4) elected members of national, state and local governments who can consider legislative solutions to problems that arise during the game.

PLAYERS:

As much as possible, all players should faithfully play their roles including entrepreneurs, regulators, activists, legislators, TV news reporters, venture capitalists, bankers, interested members of the public, etc. A list of players and their team assignments is given in Appendix A. The game schedule is described in Appendix B.

GAME OBJECTIVE:

The primary game objective represents attempts by the Blue Teams to develop and sell their products and technologies, or to implement them to deal with pressing environmental problems. To accomplish this, they must have a good product, be able to overcome the regulatory, legal and citizen requirements placed in their path by the Green Teams, gain technical and financial support, and convince a customer of the desirability of their product. The Blue Teams are encouraged to develop partnerships and alliances with labs, universities, consultants, customers, and even each other. Being part of a winning team of businesses is better than just losing as an individual company. The Blue Teams are also encouraged to work for win/win agreements with regulators, environmental activists, state legislators, the public, and the news media.

The game is designed to investigate environmental issues such as: uniform versus multiple permitting; standards for determining how clean is clean enough; regulations originating from a multitude of different environmental agencies; surface water standards; public acceptance; environmental justice; and philosophies that limit environmental action such as NIMBY (Not in

my back yard).

A schematic diagram of all the teams and their connections is shown in the attached figure.

Blue Teams (entrepreneurs, businesses):

The Blue Teams are each provided with a fixed amount of money (\$10M for the duration of the game) to spend to pass the requirements developed by the environmental teams (federal, state and local, the public, and environmentalists). They may also seek additional finances from the bankers or venture capitalists (or even potential customers), if they can convince them of the soundness of such an investment. If their products are in need of additional research and development and/or testing, they may contract with the Yellow Team for help. Attorneys on the Red-J/L (judicial/legal) Team are also available for consultation or lobbying at a negotiated price. The Purple Team may also partner with and support the entrepreneurs during the play of the game.

Appendix C provides a fictitious sample of play for a Blue Team. Appendix D provides a balance sheet form that should be used by all Blue Team analysts and recorders for this game. Appendix E is the requirement form that must be used by all Blue and Green Teams in determining whether a requirement has been successfully completed. Appendix F provides an agreement form that should be used as written documentation for all deals, contracts, purchases, and agreements between any teams over the course of the game. No deals can be considered valid without a written contract signed and dated by the parties and by the Control Team. Appendix G is a form for recording court decisions. Appendix H is a sample business plan that could assist Blue Teams in procuring loans from the Red-Financial Team. Appendix I provides some environmental background information including a brief history of major US environmental law, permits necessary for landfills in California, and technology certification in California. Appendix J is a glossary of terms and acronyms used in this handbook.

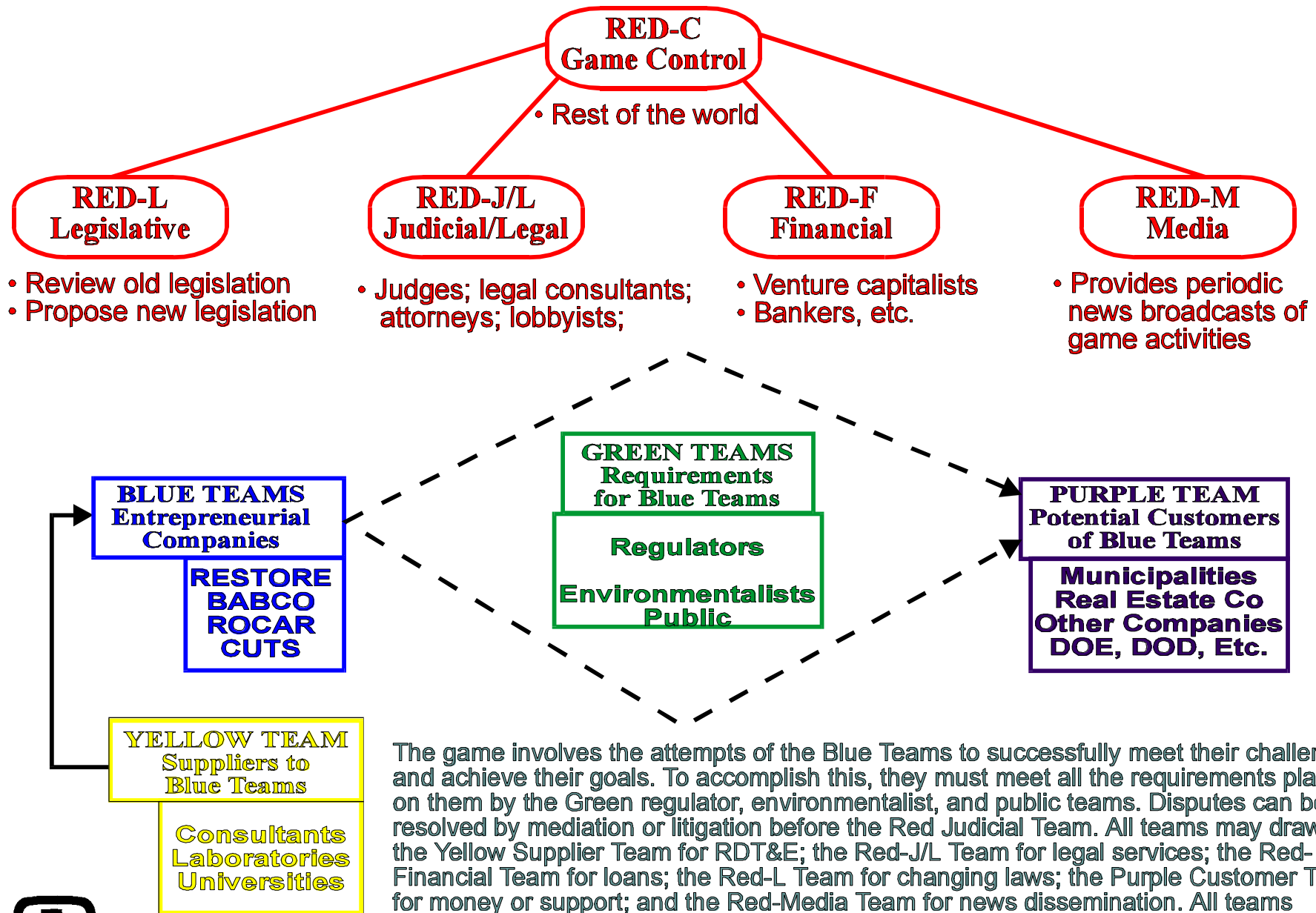
Blue Teams 1 (Restore) and 2 (BABCO) represent single companies. Blue Teams 3 (ROCAR) and 4 (CUTS) represent partnerships between two companies, one large and faced with an environmental problem, and one small entrepreneurial company with a technology solution. For Blue Teams 3 and 4, only the large companies receive the \$10M. The two smaller companies may seek funding only from outside sources.

Green Teams:

Green-R (Regulators):

In the first session, the Green-R Team will separate into four groups representing the USEPA and three state or regional groups (e.g., the Manuel Air Quality Management District, the San Manuel County Environmental Health Agency, the Grimesville Water Quality Board, etc.). Each of these four groups will then provide one requirement (in writing using the form in Appendix E) that the Blue entrepreneur teams must overcome in order to receive a permit to use the technology or products. The Green-R Team can request the status of permitting of each Blue Team, and develop their requirements any way they choose (in accordance with existing environmental law), but they must not exceed one requirement per group, or four total. The scenarios provide the only information that the regulators must consider. The regulators can evaluate additional claims by the Blue Teams, but the regulators are the sole determinants of their requirements.

Figure 1. ENVIRONMENTAL PROSPERITY GAME SCHEMATIC



The game involves the attempts of the Blue Teams to successfully meet their challenges and achieve their goals. To accomplish this, they must meet all the requirements placed on them by the Green regulator, environmentalist, and public teams. Disputes can be resolved by mediation or litigation before the Red Judicial Team. All teams may draw on: the Yellow Supplier Team for RDT&E; the Red-J/L Team for legal services; the Red-Financial Team for loans; the Red-L Team for changing laws; the Purple Customer Team for money or support; and the Red-Media Team for news dissemination. All teams should play their roles as in real life. Game “duration” is five years.



Green-E (Environmentalists) and Green-P (Public):

The Green-E and Green-P Teams will develop their own requirements (no more than two from each) that the entrepreneurial teams must pass. They may also review the Green-R requirements and accept or oppose them. If they oppose some (possibly because they are believed to inadequately protect the environment), they may prepare a brief to present to the Red-J/L Team judges for resolution. They may also seek legislative changes from the Red-L Team legislators. The Green-E and Green-P Teams are provided with \$2M each that can be saved or spent over the five-year duration of the game. This money can be used to file suits, pay court costs, initiate legislation, hire consultants, conduct research, or even to invest in environmental technologies that they like (in the form of grants or small business research and development contracts). This Handbook contains a preliminary list of suggested requirements; they are provided only as guidance -- the Green Teams will develop their own requirements.

The entrepreneurial teams must convince the Green Teams that they have overcome each requirement or hurdle; this is accomplished by a written (and oral) presentation from the Blue Team to the Green Team which results in a majority of the Green Team members agreeing. If the Green Team disallows a requirement, the Blue Team can try again, seek support from other agencies or legislators, buy additional technical support, or file a suit. Five sessions (years) will be available to overcome the requirements.

The Green-E Team should divide its membership up to faithfully represent different elements of the environmental community, not all of whom are in agreement. Examples might include the Rockies Club, Citizens Against Suspicious Technologies (CAST), Californians for Environmental Justice (CEJ), The Greenbelt Association, etc. Similarly, the Green-P Team should subdivide into several groups; e.g., San Manuel and Grimesville Chambers of Commerce, the Country Club Neighborhood Association, Businesses for Sustained Development, Democrat-Republicans for Progress, etc. All Green-P players live in either San Manuel or Grimesville.

Yellow Team:

The Yellow (consultant/laboratory/university/business incubator) Team can provide advice (for a fee), act as a testing or certification lab, an honest broker, or a source for additional development of a technology. Success or failure of R&D investments will be probabilistic. The labs and universities can estimate the investment required for a 50% probability of technical success. A normal distribution will be generated and the success or failure of the investment will be determined probabilistically - the higher the investment, the more likely it will be successful. The Yellow Team is provided with \$2M that can be used as matching funds for R&D ADAs, support for new technology development or other appropriate uses. The Yellow Team may request additional funding from the legislature (Red-L) in 1997 (Session 3 only), if they can convince them. The Yellow Team players can assist the other teams in their presentations, in the court cases, etc. Appendix F forms must be used for all agreements. Research and testing results will be recorded on those forms by Control.

Purple Team:

The Purple (customer) Team is composed of several possible customers for the Blue technologies, including (but not limited to) businesses (e.g., Urban Sprawl Development Corporation, Galaxy Business Machines, Choco Chip Semiconductors, Awesome Aerospace, Gary Motors Corp.

(GMC), Western Gas & Electric, Sludgeco Industries, etc.), municipalities (e.g., the mayors of San Manuel and Grimesville, the San Manuel County Board of Supervisors, the Country Club Neighborhood Association, etc.), military bases (e.g., Alameda Naval Base), DOE waste sites, national laboratory sites (as customers/contractors), other industries, municipal sewage and solid waste departments, and even foreign governments or companies (dual roles are permitted). Customers can choose between competing products, or support several of the Blue Teams. Each Purple Team player will be given \$200,000 for each session (years 1995 to 2000). They may spend this money to further their own causes, either independently or in partnership with other customers. The Purple Team should identify its problems, possible solutions, impact of regulations, procurement problems, etc., and provide these to the appropriate teams.

Red Teams:

Red-J/L

The Red-J/L (judicial/legal) Team performs two functions. If necessary during the course of the game, it can hear lawsuits (or requests for mediation) from any other team. It may issue injunctions against any party after hearing the evidence. Its decisions are final - no appeal. Filing a court case will cost both the plaintiff and defendant money according to the attached table of services, Table 1. Additional fines or punitive damages can be assessed at the discretion of the judges. The Red-J/L players are lawyers and judges already knowledgeable about environmental laws and regulations.

TABLE 1: DISPUTE RESOLUTION

DEFINITIONS

Mediation: Mediated disputes will be settled through minimal intervention by the mediator. Disputing parties will be expected to bring disputes that can be resolved expeditiously and provide all the data and information in a framework that will support expeditious resolution. Resolutions that cannot be reached expeditiously can be arbitrated or litigated. Resolutions that cannot be reached within the time allotted, must be arbitrated or mediated.

Mediation is best suited for controversies that are multi-party, multi-issue and multi-interest oriented.

Arbitration: The arbitrator will act as the party responsible for providing a solution to the disputing parties. Disputing parties will be expected to bring their case in a manner most conducive to expeditious resolution.

Arbitration is best suited to a few well-defined issues that cannot be resolved through mediation.

Litigation: Litigation is the "last resort" dispute resolution option that should be reserved for controversies that cannot be effectively mediated or arbitrated.

**IN THE MATTER OF THE ENVIRONMENTAL PROSPERITY GAME
JUDICIAL RULES IN THE STATE OF CALIFORNIA**

STATEMENT OF PURPOSE AND BASIS:

The Judicial Team has instituted rules for parties interested in seeking resolution to matters in conflict or dispute on account of the complexity of environmental issues. These rules were developed to facilitate the process of resolving conflicts in a timely and cost-effective manner. These rules are binding on parties petitioning this Court.

RULES:

Rule #1: Parties seeking resolution of matters in dispute or conflict have three options available to them **mediation, non-binding arbitration and litigation**

Rule #2: Filing fees will be assessed in accordance with the following schedule:

Non-binding mediation	\$200,000 per party
Non-binding arbitration	\$500,000 per party
Binding litigation	\$1 million per party

Rule #3: The parties can expect that the following time allocations will be required for pursuing each of the options for resolution:

Non-binding mediation	10 minutes
Non-binding arbitration	20 minutes
Binding litigation	30 minutes

Rule #4: Parties seeking judicial assistance must file an application with the Court prior to appearance that includes the following information:

1. Names and representatives of the party.
2. Choice of the resolution option selected.
3. Identification of the legal issues involved including appropriate citations to applicable statutory and regulatory provisions, and/or common law principles.
4. Identification of any relevant technological issues or uncertainties related to the dispute or controversy.
5. Identification of the principal interests involved in the dispute.
6. Identification of the possible alternative solutions to the dispute.
7. A list of the facts or circumstances including agreements among the parties to the dispute.

Rule #5: Fees must be paid before the parties appear before the court.

The second function of Red-J/L players is to provide legal services to any team requesting them at negotiated prices. They can consult with the Blue, Green, Yellow, and Purple teams to provide advice, lobbying assistance, attending hearings on pending legislation as advocates, or as lawyers in court. Players that present briefs in court for the plaintiff or defendant teams may of course not simultaneously sit as judges.

Red-F (Financial):

The Red-F (financial) Team (bankers, venture capitalists, etc.) can provide additional funds to other teams under any conditions acceptable to both parties. The funds can be used for R&D, testing, building plants and equipment, lobbying for legislation, advertisements in the media, or any other acceptable purposes. In Session 1 (1995), each player on the Red-F Team will receive \$1M. They may act individually or team with other Red-F players to invest their funds. The growth of their investments will depend on interest and dividends received over the course of the game. Additional investment capital will be provided in 1997 (\$1 M per player) and 1999 (\$1M per player). The Red-F Team should discuss the risks and legal liabilities of their possible investments, and create investment teams as they wish.

Red-M (Media):

The Red-M (media) Team includes representatives of the media, including journalists and local and national TV anchors. They monitor the game and report on the proceedings in short news reports throughout the game. The media can respond to the activists, entrepreneurs, or regulators as they wish, and their reports may be able to impact the game direction and outcome. The teams may treat the media as they would in real life: talking, informing, complaining, seeking support, etc. The media may also sell ads for publication at negotiated costs.

Red-L (Legislative):

The Red-L (legislative) Team can decide to represent only the state legislature, or split into federal and state houses. They will debate the bills already in the hopper and propose new laws as they see fit. They may also seek out other players' (their constituencies) opinions and hold public hearings. They may also choose to investigate other bodies or seek evidence for proposed legislation. Any group desiring the passage of a new law may prepare a bill, and pay the Legislative Team \$100K to have the bill placed in the legislative hopper. Proposed laws will pass if they receive a majority of the votes from the Red-L players. The legislative team might also discuss the key question of "What is clean enough?" and how to have laws reflect this situation. They may pursue any other areas deemed appropriate for a legislature.

The legislature will receive tax revenues of \$1M in each year beginning in 1996. They may spend these funds any way they choose, based on a majority vote.

Team Goals

The primary and secondary goals of the entrepreneur teams are to make money and to protect the environment, respectively. The regulatory teams want to protect the environment without unduly hindering the efforts of the entrepreneurs to make money. The environmentalists main goal is protection of the environment. The public's main goal will be determined by the players, but will probably represent a blend of environmental protection with sustainable economic growth. The customers (Purple Team) want their sites cleaned efficiently and at low cost; they may also

promote the introduction of new environmental technologies into the marketplace through technology certification. The Red-F Team's goal is to maximize the return on their investment.

Entrepreneur teams can appeal any regulations based on their understanding of the law, including scientific bases, undue burdens, or constitutional issues.

All teams (and players) should keep a record of income and expenditures over the course of the game; this information will be used in the preparation of the final game report.

Any team that goes bankrupt must file Chapter 11 and go to court. The judges will dispose of the case as they see fit. Table 2 lists the income and payment dates for each team.

TABLE 2. TEAM AND PLAYER EXTERNAL INCOME

Team	1995	1996	1997	1998	1999	2000
Blue 1 - Restore	\$10M	0	0	0	0	0
Blue 2-BABCO	\$10M	0	0	0	0	0
Blue 3-Big Oil	\$10M	0	0	0	0	0
Blue 3-Clohi	0	0	0	0	0	0
Blue 4-Behemoth	\$10M	0	0	0	0	0
Blue 4-Electra	0	0	0	0	0	0
Green-Regulators	0	0	0	0	0	0
Green-Environmentalists	\$2M	0	0	0	0	0
Green-Public	\$2M	0	0	0	0	0
Yellow	\$2M	0	0	0	0	0
Purple: Each player	\$200K	\$200K	\$200K	\$200K	\$200K	\$200K
Red J/L	0	0	0	0	0	0
Red-Financial: Each player	\$1M	0	\$1M	0	\$1M	0
Red-Media	0	0	0	0	0	0
Red-Legislative	0	\$1M	\$1M	\$1M	\$1M	\$1M

At the end of the game, players from each team will summarize the highlights of the play and the lessons learned. The players will fill out evaluation sheets and provide their comments. The highlights of the game will be documented in a subsequent game report.

KARMA KARDS:

The Blue and Green Teams will pick a KarmaKard at the start of each session beginning with Session 2. These cards can advance or hinder the progress of the teams; they are meant to represent those unpredictable events, both good and bad, that affect our plans and strategies. In addition to receiving or paying amounts of money, theKards can also be used to supplement Blue Team arguments in their presentations to the Green Teams. Possible KarmaKards include:

FOR ENTREPRENEUR TEAMS:

The USEPA has issued a grant of \$500,000 for a pilot study of on-site VOC treatment technology for soil and groundwater cleanup.

You receive 10 minutes of an environmental legal consultant's time free. Value = \$10,000. (Give card to lobbyist.)

You receive 10 minutes of a lobbyist's time. Value = \$10,000. (Give card to lobbyist.)

You may submit one bill into the legislative hopper. Value = \$100,000. Give to Red-L.

You are fined \$1M because of pollution caused by the previous owner of your facilities.

You receive an international unrestricted grant of \$1M for Certified Technology Transfer and expansion.

A venture capitalist invests \$1M in your company.

One new member has been added to the Green-Regulator Team who is sympathetic to your company. You receive one proxy vote in favor of passing any single regulatory requirement of your choice.

One new member has been added to the Green-Public Team who is sympathetic to your company. You receive one proxy vote in favor of passing a Green-P requirement.

One new member has been added to the Green-Environmental Team who is sympathetic to your company. You receive one proxy vote in favor of passing a Green-E requirement.

You receive a \$2M grant to be spent only at a national laboratory for research, development, testing or model development.

You are able to change the opinion of one of the judges who might vote against you in the next law suit; with thisKard (and a threat to expose an illicit affair), a single judge's negative opinion is reversed.

As a result of 40 days and nights of rain, you have incurred facility damages of \$1M.

You gain key patent protection for your technology. Collect \$2M.

A competitor gains a key patent that you need for your product. You lose \$2M.

Los Angeles air district (or water board) approves your technology, opening up the huge LA market. Collect \$1M.

San Francisco air district (or water board) requires additional testing before approving your technology. You lose \$1M.

You are able to change the opinion of one of the judges who might vote against you in the next law suit; with thisKard (and a job offer), a single judge's negative opinion is reversed.

You are fined \$1M for environmental pollution.

You win a government grant of \$1M.

One player on your team must leave and exchange places with a regulator team member.
One player on your team must leave and exchange places with an environmentalist team member.
One player on your team must leave and exchange places with a member of the public.

FOR ENVIRONMENTALISTS AND THE PUBLIC:

Go to jail for violating a court order on picketing (i.e., \$100,000 fine).
Get out of jail free. Value = \$100,000.
You are able to change the opinion of one of the judges who might vote against you in the next law suit; with thisKard (and a threat to expose an illicit affair), a single judge's negative opinion is reversed.
For meritorious service, you receive a \$1M grant for environmental protection.
Your community loses 5000 jobs. You lose \$1M.
If you have previously allowed any Blue Team to pass a requirement, you receive \$1M which represents the creation of 200 new jobs in the application of a new certified environmental remediation technology. If no requirements have been passed, this card is void.
You are permitted to introduce one new bill to the legislature without a lobbying fee. Value = \$100,000.
A rich environmentalist dies and leaves you \$1M in his will.
You receive 10 minutes of an environmental legal consultant's time free. Value = \$10,000. (Give card to lobbyist.)
You receive 10 minutes of a lobbyist's time. Value = \$10,000. (Give card to lobbyist.)
You may add one additional requirement for a designated Blue Team.
One player on your team must leave and exchange places with an entrepreneur team member.

FOR REGULATORS:

You are able to change the opinion of one of the judges who might vote against you in the next law suit; with thisKard (and a threat to expose an illicit affair), a single judge's negative opinion is reversed.
As a favor to your brother-in-law, one player must donate ten minutes of his/her time to advise a Blue Team on how best to meet your requirement.
Asbestos has been found in your office spaces. During mediation, you must split up and wander around the room for ten minutes.
You may add one additional requirement for a designated Blue Team.
The administration has cut your budget. One player on your team has been laid off, but has been offered a job in industry. Exchange places with an entrepreneur team member.

RULES OF PLAY

BANKRUPTCY:

A Blue Team may maintain a zero balance. However, if the balance goes negative, the Blue Team goes into Chapter 11 bankruptcy; the court (Red-J) then decides on the required actions and determines when or whether the team may resume play.

BOOKKEEPING:

All bookkeeping will be performed by the recorders or analysts assigned to each team. They will make the appropriate entries and keep the books up-to-date. Team members can verify accuracy whenever they choose.

CONTRACTS:

Contracts or agreements can be carried out between any two or more teams. A Control Team member must be present at the formalization of any contract, which must be in writing; a member of the Control Team must sign and date the agreement for it to be valid. If the success or failure of the contract is determined probabilistically, Control will perform the necessary calculations and report the results to the parties immediately. In contracting for services from the Yellow (consultants/lab/university) Team, the Yellow Team will attempt to realistically estimate the costs of providing a service or product that would yield a 50% probability of success. Half this cost will be taken as one standard deviation. Success or failure will then be determined by sampling from a normal distribution with the actual sum invested by the Blue Team. For example, investing 50% more than the median estimate will yield a probability of success of 84.1%; investing twice the median estimate will produce a probability of success of 97.7%. When contracting for consultant or legal services, the consultants may provide advice, help draft the Blue presentations, and even appear on their behalf at the presentations to the Green Teams. Services of the Yellow and Red-J/L teams are available to all teams at negotiated prices.

DISPUTES:

All disputes will be resolved by the Control Team, whose decisions are binding.

EXCHANGE OF PLAYERS:

When a KarmaKard requires the exchange of players between two teams, the teams will first be asked for volunteers. If there are no volunteers, the exchanged players will be chosen by selecting straws. The process will be monitored by the Control Team. Players are obligated to come up to speed as quickly as they can on their own, and should not slow the new team's progress. Players should adopt the perspectives of their new team, and play their roles authentically. Exchanged players will remain with their new teams for the remainder of the game.

FINANCING:

All teams have several avenues available for procuring funding. They may borrow directly from the Red-F Team bankers or venture capitalists in exchange for a share of equity or by paying interest. The Red-F Team will determine its own requirements for lending. Blue Teams may also seek grants or investments from potential customers (Purple), or matching funds or grants from the laboratories (Yellow).

KARMA KARDS:

At the start of each session, the Blue and Green Teams will select a card from a shuffled deck, handed to them by the team facilitator or analyst. The instructions must be carried out immediately.

LAWSUITS:

Lawsuits can be filed at any time by any team. An odd number (at least 3) of judges must hear the case. After both sides have presented their arguments, the judges decide by majority rule. Judges' decisions are final and binding. Litigants must appear before the judges at their scheduled times. If one litigant is one minute late, a judgment will be immediately rendered in favor of the litigant who is present. If both litigants are five minutes late, the case will be dismissed; the litigants will need to reschedule their court times.

LEGISLATION:

If the Blue Teams are unable to overcome a requirement, they may seek legislative relief. Seeking new legislation costs \$100,000. The proposed new law should be presented in writing. The Red-L Team can hear legislative proposals at any time, hold public hearings, and conduct open or secret debates. By a majority vote of at least two players, they may decide to pass the legislation as proposed; they may also decide to modify the legislation as they wish. If the law is passed, a copy of it is immediately transmitted to all other teams. The law is binding, but may be challenged in court. If challenged by any team, the rule on lawsuits applies.

PRESENTATIONS:

A standard form (Appendix E) will be used by the Blue Teams in claiming that they have passed a requirement. The form will include the Blue Team number, the requirement description and the Green Team which produced it. Arguments should be presented in brief bullet form. Space will be provided for notes on the presentation discussion. A completed form signed by a Control Team official will be required for proof of passing or failing the requirement.

PROXIES:

A team member may be away from his/her team because of litigation, negotiating with other teams, making deals, talking to Control, being interviewed, etc. If he chooses, he may leave his proxy vote (in writing) on an upcoming issue. The facilitator will then cast that vote as if the player were present.

Some KarmaKards allow proxy votes; these may be used for any single vote, and act like an additional voting player.

REQUIREMENTS:

The Green (regulators, environmentalists and the public) Teams each develop requirements that must be overcome by the Blue (entrepreneur) Teams. In the initial sessions, each Blue Team is assigned to make a presentation to each Green Team in a specified sequence. After each Blue Team has presented to all the Green Teams, subsequent meetings are planned by appointment. The Green Teams read the arguments of the Blue Teams and hear additional oral presentations. If they are convinced that the requirement has been overcome, they vote to approve the Blue Team product or technology. A majority vote is binding. The Green Team can (and should) provide guidance to the Blue Team as to what needs to be done (further R&D, testing, etc.) to make the product acceptable. Requirements once overcome cannot be rescinded unless a Green Team believes that the Blue Team has not lived up to its obligations; i.e., their product does not meet environmental requirements, or their presentation has omitted or obscured certain facts. If the Green Team wishes to rescind a previously passed requirement, they must bring a suit before the Red-J/L (judicial/legal) Team.

If a Blue Team finishes its presentations early with its assigned Green Teams in sessions 2-5, it may schedule a presentation with another Green Team (if and when they are free) to either make a new presentation or revisit a requirement which was previously denied.

SCHEDULES, APPOINTMENTS

It is essential that all players strictly follow the agenda and be on time for their appointments. Penalties will be assessed for teams that are late.

TIES:

In the case of tie votes by the Green or Red Teams (due to an even number of players), the Control Team will flip a coin to make the final determination.

BLUE TEAM SCENARIOS

BLUE TEAM 1 - RESTORE, INC.

Company Structure, History, and Products:

Restore, Inc. designs, constructs and operates modern landfills. They have been in business since 1982, serving communities in California, Oregon and Nevada. They have grown to 2300 employees in 18 facilities located in the three states. They also operate a small research laboratory in San Jose that investigates new concepts for more environmentally benign landfills. Restore had net sales of \$250 million in 1994, with a net income after taxes of \$12 million. Their stock is traded over the counter with 50 million shares outstanding; the most recent stock price was \$3.50 per share.

Restore would like to become a national company serving all states. They have developed a complete solid waste system that they claim is the most technically advanced and environmentally acceptable process in the country. The three-pronged Restore system includes: 1) a recycling program covering 50% of the total waste; 2) composting 25% of the waste and converting it into materials for agricultural fertilizers and soil enrichers; and 3) disposing of the remainder of the waste (25%) into a modern landfill. This landfill will be triple-lined and have leachate and methane controls. The chemical consistency of the collected and treated leachate makes it usable as a critical component for hydrogen fuel cells which have applications for electrically powered vehicles. The methane gas drawn off from the landfill will be sold to Western Gas & Electric for electricity generation.

Restore wants its landfill system to become the model for the rest of the US. They expect that it will set industry standards well into the 21st century.

Scenario:

San Manuel is a California community of 50,000 people located on the ~~Tule~~ ^{Thule} River estuary, which flows into the Pacific Ocean. San Manuel County has a population of 200,000. San Manuel is economically depressed. There has been a steady exodus of young people because of a lack of jobs in the area; the county's unemployment rate is currently 18%. Manufacturing, fishing, and logging have been declining for many years; even some high-tech software companies are discussing plans to relocate away from San Manuel. Most recently, the US Air Force has shut down the San Manuel base, further reducing the number of jobs and income available to the area. However, the community considers itself among the most environmentally conscious cities in the state. The last election has resulted in a shift in political leadership in the city and county; it produced a mix of officials, some of whom strongly support economic development in the community, and others who remain strongly committed to environmental protection, even at the cost of economic development.

Restore has petitioned the County Board of Supervisors for the necessary permits to design, construct and operate their landfill and sewage treatment concept on 160 acres of the site of the closed Air Force base on the north end of town, about one mile from the San Manuel Country Club. The company claims that their facility will collect and process all the refuse of the entire county (more than 450 tons per day). Restore has described a 20-year plan over which the landfill would gradually be replaced by a marina, a baseball park, a landing strip for model airplanes, and eventually an industrial and

commercial park. Several companies have been approached to buy or lease space in the vicinity of the landfill, including waterfront property.

The California State Environmental Protection Agency is also studying the San Manuel situation. Although the initial reactions have been favorable, Cal EPA has advised Restore that their project will be scrutinized more closely than those which use existing technology. In particular, attention will be paid to trace levels of heavy metals and toxic chemicals.

San Manuel's current landfills will not reach capacity for at least one year. The city and county have been offered competitive proposals for alternative conventional landfills that would be sited in blighted urban neighborhoods or on currently unproductive farm land. The conventional landfills are comparable in total costs to the more technologically advanced Restore proposal, primarily due to the land donated by the military for the Restore project; DoD has refused to provide this land for a conventional landfill disposal system. Some members of the community have expressed concern that property values will fall substantially in the neighborhood of the facility.

The San Manuel Observer, the local newspaper, has strongly supported the Restore project in its editorials. "We must do something proactive for our community," said editor Mike. He staunchly defends this project despite criticism from some environmental groups and citizens, including his wife, an environmental activist. She has recently threatened divorce unless he ceases promoting this facility.

Issues and Challenges:

Financial:

The company has estimated the initial cost of facility construction at \$23.2 million including land, or \$21.6 million if the military base is used. Tipping fees, currently estimated at \$35/ton, would be negotiated and should be less than conventional facilities. The Department of Defense has offered the closed military base as a site for the facility at no cost. This grant makes the San Manuel site especially attractive to Restore to demonstrate its new landfill concept. However, the clean-up costs of the base could be significant and no agreements have yet been reached by Restore, or San Manuel. Other communities have also expressed interest, but Restore is willing to give San Manuel an option on this first-of-a-kind system. Although Restore has raised \$16 million, it needs more investors, and would also like tax breaks and other incentives from the city and county of San Manuel. Restore estimates that it would barely break even on this facility; its incentive is to get the demonstration plant up and running to garner a large domestic and foreign market. Some citizens have stated that Restore's costs are grossly exaggerated. They feel that Restore should complete the project at a much lower cost, even at a loss. They believe that Restore will more than recoup its investments through publicity and future customers. Some feel that Restore should also pick up the base clean-up costs, but Restore is resisting this strenuously.

Technology:

Restore has developed a new type of anaerobic bacteria to accelerate the decomposition of municipal solid waste. This biologically accelerated decomposition (BAD) process decomposes waste into methane, water, carbon dioxide, and residuals in six months, rather than the 15 to 20 years required for decomposition in conventional landfills. They claim that the BAD process produces 66% more methane gas in much less time (2.5 cu. ft. per pound of waste in six months compared to 1.5 cu. ft. per pound in 15 years). It also reduces the volume of residual waste by 50%. However, these results are based on laboratory-scale tests only. There has been no large-scale testing, and only very simple

computer models have been developed. Restore hopes that the proposed San Manuel demonstration facility will allow them to skip the plant pilot phase (¼ scale) and provide complete validation of the technology.

Restore has also developed new sorting and marking processes to separate biodegradable from non-biodegradable wastes; this will allow cheaper and faster methods for separating glass, ferrous and nonferrous metals, tires, paper, plastics, etc. They have also been discussing a Cooperative Research and Development Agreement (CRADA) with Jefferson National Laboratory to embed microchips in plastics manufacturing to assist later sorting.

Permitting:

Restore company officials have privately admitted that they are completely confused by the permitting process in California. No government agency seems to have final approval authority. Furthermore, approval by one local or regional board does not seem to grant approval even for neighboring counties and regions, nor elsewhere in the state. Restore also believes that meeting all current regulations would not protect them from new and more onerous environmental restrictions in the future. Restore would like to work with government agencies to develop one-stop shopping for permitting that would be accepted throughout the state, and to create some stability with respect to future obligations.

Siting:

The traffic to and from the landfill and the recycling center/transfer station (25 trucks a day) will go down Country Club Lane, a prime residential area of San Manuel. Further, a large sewer line will have to be installed which will cut across the 9th green of the golf course, requiring the green to be relocated 100 yards to the east. The Country Club Neighborhood Association has opposed this site, although they favor the landfill concept. They have proposed an alternative site in a blighted area on the south side of town. However, a local activists group, Californians for Environmental Justice (CEJ), claimed that this alternative site is another example of “dumping” on minority neighborhoods. They claim that “environmental justice” would be served by the existing north-side site.

Odors:

The company has stated that the landfill will emit no obnoxious odors. Their patented suite of bacteria should eat the odor-causing materials, and greatly reduce the emissions of hydrogen sulfide, ammonia, nitrates and nitrites, and other chemicals. Several citizens have claimed that they want additional assurances that this is the case. They believe that the company’s claims must be verified by neutral scientific organizations, especially at the large scales of the actual facility.

Environmental Impact:

The facility would be located on the estuary of the Turke River, connected directly to the bay and the ocean. If the facility were poorly designed or operated, it could cause damage to the salmon migration up the Turke River. A local law firm has been retained by an unnamed organization, to oppose the facility in the courts. The lawyer states that environmental damage “is certain,” and that the company’s application for permits must be denied.

The environmental activist community is split on Restore. One individual expressed the private thought that “the devil is in the details.” Some environmental groups are strongly opposed until considerable additional studies have been done on long-term safety, operational accidents, environmental impact, and specific recycling technologies.

Timing:

The company has been negotiating with the county for six months. Investors are becoming anxious and impatient. Restore has decided that it can only grant the county six more months to make a decision. After that, they will begin to negotiate with other California communities for this first demonstration plant and landfill concept. In fact, Restore has already been contacted by a coastal community further to the south, where a coalition of community leaders has expressed an interest in siting the facility.

Foreign Involvement

Restore has opened negotiations with communities in Japan, Mexico and Russia. They believe that the potential global market is much larger than the US market. Although they would like to develop and prove their concepts in the US, they will seriously pursue foreign partnerships. If the San Manuel facility is approved, they would use it as a demonstration. However, they have not ruled out building a demonstration plant in a foreign country.

COSTS FOR RESTORE FACILITY - 1995 ESTIMATE

	<u>\$000</u>
Land (160 acres, \$10K per acre)	1600†
Equipment	1500
On-site improvements (including sewage treatment plant)	5000
Off-site improvements	2000
Liners	4000
Leachate control system	1200
Composting arena	800
Excavation	500
Transfer station/recycling unit	1200
Trucks - transfer (8 trucks)	<u>1600</u>
Subtotal	\$19,400
Contingency	<u>3800</u>
Total	\$23,200*

†No cost if the closed military base is used.

*No clean-up costs included for military base or proposed sewer line.

RCRA Requirements for Municipal Landfills: Subtitle D

- Liner with hydraulic conductivity 1×10^{-5} cm/s
- Cover with 2 ft soil cover minimum (6" top soil + 18" compacted soil with hydraulic conductivity 1×10^{-5} cm/s or equivalent to that of liner, whichever is better.
- Leachate collection system
- Ground Water Monitoring System
- Follow Clean Water & Clean Air Acts

Consolidated Financial Statements
RESTORE, Inc.

Income Statement
[\$ in millions]
for the year ended Dec 31, 1994

Operating Revenues from Sales	\$250	
Operating Expenses	\$233	
Salaries	13	
Benefits	3	
Selling Expense	172	
Administrative & R&D	45	
Net Income from Operations		\$17
Income Taxes	5	
Net Income After Taxes	\$12	

Balance Sheet
[\$ in millions]
as of Dec 31, 1994

Current Assets		\$225
Cash		11
Receivables	28	
Property, Plant, Equip		119
Intangibles [BAD&Sort Technologies]		25
Inventories		42
Current Liabilities		\$ 73
Accounts Payable		40
Notes Payable		25
Accrued Taxes Payable		8
Stockholder's Equity		\$152

Statement of Cash Position
[\$ in millions]
for the year ended Dec 31, 1994

Sources of Cash		
Net Income		\$12
Effects of changes in Operating Capital:		
Increase in Accts Receivable		(10)
Decrease in Inventories		5
Increase in Accts Payable		22
Issuance of Common Stock-Additional Shares		10
Total Sources of Cash		\$39
Uses of Cash		
Purchase Treasury Bills		\$24
Dividends Declared and Paid		\$13
Change in Cash Position		\$ 2
Cash, Dec 31, 1993		\$ 9
Cash, Dec 31, 1994		\$11

Stock Position: 50 Million Shares outstanding	Market Value \$3.50/share	Book Value
\$3.04/share		
Dividends: \$0.25/share	P/E Multiple: 14	

BLUE TEAM 2 - BABCO

Company Structure, History, and Products:

The Bay Area Battery Co. (BABCO), located in Oakland, CA, manufactures a variety of storage batteries for industrial applications. Their products are sold in California, Arizona, Texas, Ohio, and New York. They have been in business since 1987 and have grown to 700 employees. In 1991, they opened a second facility near Los Angeles. BABCO has a small research laboratory and pilot facility in Novato, CA, where they have been conducting feasibility studies on a novel lithium-polymer battery that they developed in 1992. They hold several patents on this new battery. BABCO had net sales of \$75 million in 1994, with a net income after taxes of \$3.9 million. Their stock is traded over the counter with 10 million shares outstanding. The most recent stock price was \$5.60 per share.

BABCO would like to become a major player in the emerging electric vehicle market in California and the nation. In laboratory tests, their prototype lithium-polymer battery exceeded the targets established by the USABC (U.S. Advanced Battery Consortium) -- specific energy 200 Watt-hours/kg and peak power 400 Watts/kg. They have tentatively named this new battery *Nirvana*. The battery has been field-tested in six cars, all of which have been successfully driven in excess of 100,000 miles, with an average city-driving single-charge mileage of 159 miles. With minor improvements, BABCO is certain that it can raise this range beyond 200 miles. BABCO has utilized life-cycle assessment (LCA) methodologies to design a factory-of-the future concept for an environmentally conscious, energy efficient manufacturing facility. Bench tests and computer simulations at their Novato research laboratory have clearly demonstrated the feasibility of a "zero-effluent" electric battery manufacturing plant. BABCO wants to build a prototype production facility that would set the industry standards for the 21st century and that would establish a leading position for them in the future electric vehicle industry.

Scenario:

In 1990, environmental officials in California told auto makers that by 1998, 2 percent of their annual sales in California must consist of "zero-emission vehicles" completely free of exhaust pollution -- a standard that can only be met by electric cars. The target will jump to 5 percent in 2001 and to 10 percent in 2003. California's standards have recently been adopted by New York and Massachusetts, and a move to institute a similar program throughout the Northeast was approved early last year by a majority of the twelve states involved. The measure is currently before the Environmental Protection Agency (EPA). On May 13, 1994, the California Air Resources Board (CARB) voted to uphold a mandate requiring the auto industry to sell electric-powered cars in the state by 1998.

This decision paves the way for investment and new jobs in a new industry. Separate economic studies have estimated that 10,000 to 70,000 jobs would be created by 2010 if CARB stuck by its original mandate. But electric cars still leave much to be desired. The batteries within today's models (primarily lead-acid) store only a fraction of the energy produced from a tankful of gasoline. This restricts the vehicles to a range of approximately 100 miles, and only about half of that in stop-and-go traffic or when headlights or other accessories are in use. Nevertheless, consumers will be attracted to advanced electric vehicles that are quiet, need little maintenance, and can be recharged at home rather than at a service

station. A major key to the success of the electric vehicle is the need for an advanced battery that would provide an extended operating range of more than 200 miles between recharges.

BABCO would like to construct a new 100,000-sq-ft manufacturing plant for its Nirvana battery. The new plant will cost \$38.6 million to construct and bring on line, and will require extensive financing. Approximately 75 jobs will be created by the new factory during the first year of operation. It is expected that at full capacity, during the third year, there will be approximately 200 workers at the new facility. BABCO has selected Grimesville, CA, a community of 75,000 people south of Oakland, for its new facility. Grimesville is an economically depressed community, which has experienced a steady decline in jobs as a result of a loss of its manufacturing base and has had trouble attracting new industries because of severe environmental and permitting regulations. At one time, the community was heavily involved in electroplating and surface finishing, but most of the plants have closed, and there has been a steady exodus of young people due to a lack of jobs. The current unemployment rate is more than 15%. This is an old industrial area with a culturally diverse population, and many recent immigrants have opened “mom-and-pop” shops primarily in the food services and produce sectors. The people here are good workers who would welcome new opportunities for employment and retraining.

The Chamber of Commerce has been actively pursuing new, clean industries and has been negotiating several tax and utilities incentives with BABCO if they would build their new facility in Grimesville. The *Grimesville Gabbler*, the local newspaper, has strongly supported the BABCO project in its recent editorials. Several environmental activist groups, however, are strongly opposed to the new plant. They clearly remember many of the environmental problems with air and water pollution that were associated with the old plating shops in town, and they don't want this to happen again. They will continue to oppose the plant until their questions are answered satisfactorily.

Issues and Challenges:

Financial:

BABCO has estimated that it will require \$38.6 million to construct and equip the new plant. As a small company with limited assets, they will need to borrow almost all of this in order to complete the project. They are negotiating with several venture capitalists and banks, but are faced with the undesirable prospect of having to trade more than half their equity in order to secure the necessary funding. BABCO has also approached USABC for funding, but during the preliminary discussions they learned that USABC would have exclusive rights to any future patents that might result from the partnership. BABCO is opposed to this, however, because of their strong patent position with respect to lithium-polymer battery technology, and they don't want to compromise their leadership advantage in this emerging market. They are still negotiating with USABC, but will probably seek other sources of funding if they can't obtain a better deal on future patents.

Gary Motors Corporation (GMC) has taken a strong interest in BABCO's batteries, and is considering a joint venture.

Technology:

BABCO has developed a new lithium-polymer electric battery as well as a non-polluting process for manufacturing the battery for electric vehicles. They feel that this battery will

enable them to gain early entry into an emerging industry. The battery has been designed for either a cylindrical (preferred by BABCO) or a flat plate prismatic configuration. The anode is constructed of a high-surface-area (proprietary) lithium-carbon composite and the cathode is made of vanadium oxide. The electrolyte consists of a polyethylene oxide containing a dissolved organolithium salt. BABCO holds patents on both the composition as well as the physical construction of the new *Wirvana* battery. Although the basic process for manufacturing these cells makes use of similar raw materials as competing processes, BABCO has incorporated design-for-environment principles that will minimize the production of hazardous waste and will optimize the use of raw materials, water, and byproducts. One technical issue that must be solved quickly involves the application of thin film technology for the fabrication of the polymer oxide. BABCO has approached Jefferson National Laboratory for technical assistance, but a potential problem exists because Jefferson is a participant in USABC and BABCO is not! Jefferson and BABCO are currently exploring the possibility of a separate CRADA (Cooperative Research and Development Agreement), but it is not clear whether this will be allowed under the existing USABC program constraints.

In the new BABCO process, nonhazardous byproducts will be recycled back into the front-end of the production process. Hazardous byproducts will be sold to ~~Stadeco~~ ^{Stadeco} Industries, located 75 miles south of the Grimesville plant, but Restore, Inc. has also indicated an interest in handling BABCO's waste. Nonhazardous solid wastes will be sent to a new Plasma Hearth facility for incineration. A particularly attractive feature of the new manufacturing plant is the use of a closed-loop recycling process that will capture over 95% of all metals and metal salts, and will return them to the incoming raw materials stream. The remaining metal sludge will be vitrified and sent to an offsite facility for disposal. In addition to metal recycle and reuse, the application of advanced water treatment technologies (e.g., ion exchange and reverse osmosis) will insure that there will be zero discharge of pollutants into the water. The plant has been designed to reduce emissions to well below all current federal, state, and local environmental requirements.

Another benefit to be offered by BABCO is the takeback of the "used" batteries at the end of their useful life. The batteries have been designed so they can be easily disassembled and reused. The owner will be able to return the batteries to special takeback facilities and will receive a new battery or will receive a credit for the purchase of a new battery in the future. In addition, the electric vehicle dismantlers will now have a new market for the batteries when they dismantle the cars. BABCO wants to become a leader in the development of new methodologies that will seamlessly integrate design-for-recyclability and design-for-reuse into all of their current and future manufacturing processes.

Permitting:

BABCO officials are also confused by the permitting process in California. No government agency seems to have final approval authority. Furthermore, approval by one local or regional board does not seem to grant approval even for neighboring counties and regions. BABCO also believes that meeting all current regulations would not protect them from new and more onerous environmental restrictions in the future. They would like to work with government agencies to develop one-stop shopping for permitting that would be accepted throughout the state, and to create some stability with respect to future obligations.

Siting:

The plant will be located near the southwest corner of Grimesville. BABCO has designed the facility as a zero-emissions factory, so that people can live close to the place where they work. This will minimize the need for a long commute, and will also result in energy savings as well as reduced air emissions from conventional vehicles. BABCO also intends to encourage van pools by making electric vehicles available to their employees. BABCO is firmly committed to the *greenspace* concept, where communities can work and play in close proximity. They are also considering building a golf course close to the plant.

Environmental Impact:

Several environmental activist groups in Grimesville are strongly opposed to the plant. In particular, Citizens Against Suspicious Technologies (CAST) has said that they don't understand BABCO's zero-discharge technology, and would like company engineers to demonstrate the feasibility of their proposed closed-loop water recycling process. The environmentalists are also concerned about potential manufacturing scale-up problems. They feel that the pilot process facility in Novato has not provided sufficient data to warrant scale-up to a production facility. Finally, these groups are concerned about BABCO's *Green-factory-of-the-future* concept, and are not convinced that the manufacturing facility can be safely operated so close to the communities where the factory workers live. An unidentified member of the Rockies Club has reported that a BABCO worker saw acid leaks during a test of the manufacturing process. The company dismisses this as completely untrue.

Timing:

Negotiations have been ongoing for more than six months on the necessary permits for the plant. One of the problems is that the regulators are not yet convinced that BABCO will be able to implement a total closed-loop water recycle system, without any discharge of effluents to the environment. BABCO is becoming impatient with the numerous rounds of negotiations and with the environmental activists in Grimesville, and they are seriously considering relocating their plant in Mexico. Discussions are currently underway with government officials in Mexico City to locate a site along the border and to construct a *Maquiladora* facility with financing from the World Bank.

Foreign Involvement:

BABCO intends to sell its technologies to interested companies not only in the U.S., but also in Japan, Mexico, and several European countries. Mexico is especially interested in clean electric vehicles because of their critical air pollution problems in Mexico City. Germany is interested because this provides an extremely good fit with their emerging infrastructure, which supports green manufacturing and product takeback. These countries have also expressed an interest in building environmentally conscious manufacturing facilities. They have suggested that the World Bank might provide funding. BABCO senior management has stated that if they are unable to gain U.S. financing or if they continue to encounter problems with environmentalists and state regulators, then they will definitely approach Mexico, and possibly also Germany and Japan.

Consolidated Financial Statements
BABCO, Inc.

Income Statement
[\$ in millions]
for the year ended Dec 31, 1994

Operating Revenues from Sales	\$75
Operating Expenses	\$70
Salaries	25
Benefits	8
Selling Expense	30
Administrative	7
Net Income from Operations	\$ 5
Income Taxes	1
Net Income After Taxes	\$ 4

Balance Sheet
[\$ in millions]
as of Dec 31, 1994

Current Assets	\$ 60
Cash	2
Receivables	7
Property, Plant, Equip	35
Intangibles [Lith/Pol & Reuse Technologies]	9
Inventories	7
Current Liabilities	\$ 6
Accounts Payable	3
Notes Payable	2
Accrued Taxes Payable	1
Stockholder's Equity	\$ 54

Statement of Cash Position
[\$ in millions]
for the year ended Dec 31, 1994

Sources of Cash	
Net Income	\$ 4
Effects of changes in Operating Capital:	
Increase in Accts Receivable	(2)
Decrease in Inventories	3
Increase in Accts Payable	1
Issuance of Common Stock-Additional Shares	0
Total Sources of Cash	\$ 6
Uses of Cash	
Dividends Declared and Paid	\$ 6
Change in Cash Position	\$ 0
Cash, Dec 31, 1993	\$ 2
Cash, Dec 31, 1994	\$ 2

Stock Position: 10 Million Shares outstanding Market Value \$5.60/share Book Value \$5.40/share

Dividends: \$0.60/share P/E Multiple: 9

BLUE TEAM 3 - ROCAR

Company Structure, History, and Products:

Big Oil, Inc. has formed a joint venture with Clohi, Inc. to form an ad hoc virtual company called ROCAR (Remove Organic Compounds At Refineries). Big Oil has been threatened with a shutdown of its three California refineries unless it takes action on reducing the emissions of volatile organic compounds (VOCs). In particular, the Manuel Air Quality Management District, the San Manuel County Environmental Health Agency, and the California Department of Toxic Substances Control have all threatened Big Oil with forced closure within five years unless the company achieves compliance; the company may also face fines of \$50,000 per day. (Big Oil internal private memos have expressed complete disgust with the current environmental regulatory burden in the State of California. Even if they manage to surmount the regulatory hurdles, they are afraid that environmentalist groups will continue to tie them up in court for more than five years. Senior management has vowed to never build a plant in the state again. Corporate high-level discussions have also seriously addressed the voluntary shutdown of the San Manuel plant, and the construction of a modern refinery in Korea.)

Clohi is a small company that has developed a thermal oxidation “hot rocks” process used to destroy toxic organic wastes in air streams. Gaseous emissions are limited to CO_2 water vapor, and less than 2 ppm NO_x . NO_x are not produced in the process; HCl and SO_2 are scrubbed where present. Clohi claims a destruction of VOCs by 99.99%- a reduction factor of 10,000 to one. Although Clohi is working closely with Big Oil on refinery leakages, they are also interested in commercializing their technology in many other areas including decontaminating soils and groundwater, and air pollution control. They are actively seeking other customers concerned with pollution prevention, environmental restoration and waste management.

Scenario:

Big Oil has proposed to regulatory agencies (and publicized in the press) the installation of Clohi units on Big Oil's refinery in San Manuel. They would also like to employ this technology at their two other refineries in central and southern California without having to seek approval of another multitude of different regulatory agencies.

Some citizens have hailed this new technology as a major step in improving air quality. They argue that current VOC emissions from the refinery are a contributor to a higher-than-average incidence of prostate and breast cancers in the area. The environmental group CAST (Citizens Against Suspicious Technologies) agrees with ROCAR's motivation, but is concerned that the technology has been oversold. They have stated that the Clohi process is not nearly as efficient as claimed; furthermore, they are concerned that new toxic organic compounds could be generated by the high temperature process. Some even maintain that the Clohi system is a thinly disguised incinerator that is not much better than current incinerators; one group claims that there is evidence that the incidence of lung cancer is higher in the neighborhood of incinerators that operate at similar temperatures.

The biggest stumbling block at present is the requirement to gain approval from 14 different regulatory agencies. Although most of those agencies have given their tentative approval, three agencies are currently considering ROCAR's request. The San Manuel Air Quality Management District, the San Manuel County Environmental Health Agency, and Cal EPA Department of Toxic Substance Control (DTSC) have promised ROCAR that they will deliver their final remaining requirements by the end of 1995. ROCAR will then have to demonstrate to the agencies' satisfaction that these requirements can and will be met.

Clohi very much wants the ROCAR joint venture to succeed. They believe that they will produce largescale evidence that the system works as claimed and is more economical than competitive systems. They also believe that a successful demonstration will allow them to market their device in other states and other countries. They are working with Big Oil to seek legislation that will allow them to market this device at the two other Big Oil refineries in California without having to endure the regulatory process two more times with different agencies.

Issues and Challenges:

Financial:

Big Oil has set aside \$10M to assist the success of the ROCAR joint venture for its three California plants and for its other refineries around the world. They believe that this new technology will be much cheaper and more dependable than the best available control technology (BACT). However, corporate executives are reluctant to invest more than this until they see significant progress. Big Oil has encouraged Clohi to seek other customers, and has agreed to consider expanding the joint venture — if they are convinced that it would be in the interests of the Big Oil stockholders and employees.

Clohi has exhausted all its available capital. However, they are actively seeking additional government (DOE, DoD, municipalities) and private customers, as well as additional financing for building an environmentally conscious manufacturing facility that would produce ready-made units for other industrial applications including automobile exhaust systems that would convert CO to CO₂, and perform similar functions in fireplace chimneys. They would also like to build a new research facility to expand the applications of Clohi systems, and to partner with national labs and universities on supporting research. They believe their technology can be expanded to convert soot and other carbonaceous solids to CO₂ as well as reducing auto exhaust emissions. Clohi has requested a letter of intent from Big Oil to help them secure additional private financing.

Technology:

Clohi is an exothermic oxidation process. The unit is preheated to approximately 1600 F by a natural gas flame or electric heater. Once the unit is heated, the waste stream is introduced into the mixing area of the unit where it is thoroughly mixed to ensure maximum destruction of VOCs. The heat produced in the process allows the system to operate continuously, without any further addition of energy. Clohi holds five patents on this technology: 1) the exothermic process for heat recovery developed at Jefferson National Laboratory; 2) the process used to thoroughly mix the waste stream; 3) the shape and nature of the hot rocks mixing chamber to ensure destruction; 4) the hardware and configuration of an upstream

concentrator for low concentration streams; 5) the hardware and configuration of the thermal unit. However, a strong rumor is circulating that John D. Control, a lawyer for a competing company, Litigious, Inc., is contesting three of those patents.

Theoretically, Clohi could treat VOCs ranging from vapors to liquid streams, as well as solids. Long term survivability of the refractory used in the mixing chamber is a concern for Clohi. To match up well with Big Oil's refinery operations, the unit needs to be more automated for long-term, unattended operations. This would require Clohi to install high-temperature sensors and conduct more detailed modeling than they were able to do in their development process. In addition, although all of Clohi's off-gas system testing has shown that they meet environmental specifications, Big Oil is concerned about the possibility that gas recombination in the off-gas system could produce other toxic species (based on statistical recombination).

Clohi will soon begin negotiations with universities and national labs to expand their technology and develop new applications in any industry where air emissions pose a hazard. Individual Clohi units are employed at pumps, valves, flanges, where VOCs usually escape into the atmosphere.

Permitting:

ROCAR is working hard both to satisfy existing permitting regulations, as well as to change those regulations in the future. They are also concerned that having invested heavily in this technology, future regulations might become even more restrictive, forcing them to begin again. ROCAR is considering working together with other companies, the state legislature, and potential customers to create more stability and a stronger scientific basis in environmental regulation. ROCAR has already hired a legal team that is researching the filing of an injunction to force the regulatory agencies to specify the scientific basis for their requirements, and to agree to keep them unchanged for a period of twenty years.

Certification:

Clohi is actively seeking certification from the California Department of Toxic Substances Control (DTSC). Certification would be very beneficial to further marketing of their technology in other states and countries. However, a current roadblock is that all thermal processes, including Clohi, have been classified as "incinerators" or "other." The California legislature has decreed that the certification process shall not be used for hazardous waste incineration technologies. Clohi and Big Oil are trying to lobby the legislature for a change in the law. (Clohi has also considered skirting the law by introducing an inert catalyst and redefining the process as "catalytic conversion.") ROCAR is also trying to convince state and federal regulators to create new categories for certifying advanced technologies, rather than trying to force these technologies into 25-year-old categories. The USEPA is also looking closely at the Clohi process and regulatory implications for its new Technology Innovation Initiative.

Siting:

The San Manuel County Board of Supervisors has agreed in principle for ROCAR to install the Clohi process on their refinery. They are adamantly opposed to the closing of the refinery and the resulting loss of 1400 jobs in the community. However, they have stated that the permitting would be conditional on the process being proven in the field. They want ROCAR

to contractually agree to remove the system and replace it if air quality is detrimentally affected by the system. ROCAR has balked at this imposition.

Environmental Impact:

ROCAR argues that they have been placed in an untenable ~~Cat 2~~ position. If they do nothing about the refinery's current emissions, they may be forced to suspend operations permanently. However, they are being forced to prove a new technology that might still have undiscovered problems. They argue that the system will be better than the status quo, but that they should not be required to invest millions to demonstrate this before the installation begins. Environmentalists are concerned that the system may not be an improvement over the status quo. They want independent verification of Clohi's process from disinterested parties such as national labs, universities, or private testing agencies. They also are concerned about global warming as a result of ~~C₂~~ releases. They have requested the state to support research at the labs and universities on processes that will result ~~zero~~ emissions.

If Clohi was sited at the refinery, some environmentalist groups fear that it might also be used to "treat" refinery wastes other than just VOCs. Treating those other wastes might produce a glass slag that could be toxic and might end up in the San Manuel landfill.

CAST has examined the Clohi process and is concerned about its fourth step: Could the concentrator create highly volatile solutions from the less volatile ones, with potential toxic or explosive mixtures? What if the system should fail or leak at this point?

Timing:

Regulatory agencies have said that Big Oil must eliminate its VOC emissions by December 1, 2000. However, they did not specify the target reductions. Big Oil is concerned that these targets may be unrealistically low. Even if the emission targets are reasonable, they are still worried that the targets will be lowered in the future. ROCAR is trying to negotiate realistic dates and emissions levels with the regulatory agencies.

Foreign Involvement:

Clohi is motivated to expand their market both nationally and internationally. They have been discussing applications in both Eastern and Western Europe, and in Mexico. Foreign governments have expressed interest, but only if the US government (Federal and State) has certified the technology to their satisfaction.

Big Oil has begun negotiations on the construction of a refinery in Korea.

Consolidated Financial Statements
BIG OIL, Inc.

Income Statement
[\$ in millions]
for the year ended Dec 31, 1994

Operating Revenues from Sales	\$3,480
Operating Expenses	\$ 2420
Salaries	910
Benefits	150
Selling Expense	1120
Administrative	240
Net Income from Operations	\$1060
Income Taxes	100
Net Income After Taxes	\$960

Balance Sheet
[\$ in millions]
as of Dec 31, 1994

Current Assets	\$15,345
Cash	400
Receivables	45
Property, Plant, Equip	890
Intangibles [In-Ground Reserves]	14,000
ROCAR Joint Venture	10
Current Liabilities	\$ 617
Accounts Payable	85
Notes Payable	517
Accrued Taxes Payable	15
Stockholder's Equity	\$14,728

Statement of Cash Position
[\$ in millions]
for the year ended Dec 31, 1994

Sources of Cash	
Net Income	\$960
Effects of changes in Operating Capital:	
Decrease in Accts Receivable	10
Decrease in Reserves	14
Increase in ROCAR Joint Venture	(10)
Issuance of Common Stock-Additional Shares	0
Total Sources of Cash	\$974
Uses of Cash	
Dividends Declared and Paid	\$960
Change in Cash Position	\$ 14
Cash, Dec 31, 1993	\$386
Cash, Dec 31, 1994	\$400

Stock Position: 500 Million Shares outstanding Market Value \$34.88/share Book Value \$29.46/share
Dividends: \$1.92/share P/E Multiple: 18

Consolidated Financial Statements
CLOHI, Inc.

Income Statement
[\$ in millions]
for the year ended Dec 31, 1994

Operating Revenues from Sales	\$1	
Operating Expenses	\$2	
Salaries	1	
Benefits	0	
Selling Expense	1	
Administrative	0	
Net Income from Operations		(\$1)
Income Taxes	0	
Net Income After Taxes	(\$1)	

Balance Sheet
[\$ in millions]
as of Dec 31, 1994

Current Assets		\$32
Cash		0
Receivables	0	
Property, Plant, Equip		1
Intangibles [Closed Loop Hearth Patents]		30
Inventories		1
Current Liabilities		\$2
Accounts Payable		0
Notes Payable		2
Accrued Taxes Payable		0
Stockholder's Equity		\$30

Statement of Cash Position
[\$ in millions]
for the year ended Dec 31, 1994

Sources of Cash	
Net Income	(\$1)
Effects of changes in Operating Capital:	
Decrease in Accts Receivable	0
Decrease in Inventories	1
Increase in Accts Payable	0
Issuance of Common Stock-Additional Shares	0
Total Sources of Cash	\$0
Uses of Cash	
Dividends Declared and Paid	\$0
Change in Cash Position	\$0
Cash, Dec 31, 1993	\$0
Cash, Dec 31, 1994	\$0

Stock Position: 13 Million Shares outstanding Market Value \$2.30/share Book Value \$2.30/share
Dividends: \$0.00/share P/E Multiple: Infinite

BLUE TEAM 4- CUTS

Company Structure, History, and Products:

Behemoth Engine Company and Electra Technologies (ET) have formed a partnership called CUTS (Clean Up The Soil) to solve an urgent problem in environmental restoration faced by Behemoth.

Behemoth is a publicly-owned diesel engine R&D, design, manufacturing and service company with plants throughout the US and Canada. Beginning in the 1950s, Behemoth operated a foundry in Grimesville, California, but closed it down in 1993. For forty years, Behemoth cleaned and degreased engines and engine parts at the abandoned foundry, pouring TCE and other solvents, diesel fuel and foundry sand on the ground at the Grimesville site. An old underground gasoline tank has leaked into the surrounding soil. The ground and aquifer are contaminated with benzene, toluene, xylene, and TCEs. The 150-acre site consists of the abandoned foundry, the office complex, parking lot, a transportation area, and four vacant lots.

Regulators and environmentalists have been pressuring Behemoth to clean up the abandoned site. Behemoth has been notified that “principal responsible parties” can be fined if pollution is found to be detrimentally affecting the water supply or public health, although no action has yet been taken. Behemoth is also strongly motivated by a possible sale of the property to a land developer for a new housing development; the sale is contingent on a rapid decontamination of the site. The company, which has five sites that are similarly contaminated, wants to remove these multimillion dollar liabilities from its books.

Almost all of Behemoth’s new-engine business has been shifted to Asian and European manufacturers. In Grimesville, Behemoth has changed its focus to the lucrative aftermarket service business. The company downsized from 1100 employees while located at the abandoned foundry to 65, all now housed in a small nearby business park.

Electra Technologies is a small, developing company that currently employs 23 people (scientists, secretaries, managers, marketers, sales people and engineers). Since different VOCs travel differently through soil, Electra’s system contains options for treatment. ET has developed a “toolbox” for cleaning up contamination due to volatile- and semi-volatile organic compounds (VOCs and SVOCs) in soil and water. Electra believes that by using their new electron beam technology for destroying VOCs and SVOCs, they can clean up the Behemoth Grimesville site in two years for a third of the cost of traditional methods. Electra subcontracts much of the toolbox technologies and operations, but the electron beam is its own proprietary technology.

Behemoth has investigated conventional clean-up technologies that will remove VOCs in five to seven years at an estimated cost of \$30 per pound of VOC. Electra claims they can do the restoration in two years for approximately \$8 per pound of VOCs destroyed. Behemoth has formed a partnership with Electra to gain regulatory approval and public buy-in to this cheaper new technology. However, Behemoth is concerned that the

permitting process and potential litigation may delay the cleanup for five years, or even indefinitely.

Scenario:

Urban Sprawl Development Corporation has been negotiating with Behemoth to buy the 150-acre site and build a residential development called Phoenix. Housing would be provided for 600 families, with 35% of the land set aside for a sports complex which includes soccer fields, baseball diamonds and picnic areas. Phoenix will include high-density town homes, as well as single-family detached homes, at prices ranging from \$190,000 to \$400,000. The land has easy access to freeways, and nearby shopping, schools and rapid transit.

Grimesville is a community of 75,000 people located south of Oakland. It is an economically depressed community, which has experienced a steady decline in jobs as a result of a loss of its manufacturing base and has had trouble attracting new industries because of contamination of existing land and facilities. Many of its plants have closed, and there has been a steady exodus of young people due to a lack of jobs. The current unemployment rate is more than 15%. Grimesville has been attempting to attract new industries with moderate success. It would also like to clean up all the contaminated sites of the abandoned plants. Grimesville favors the purchase of the abandoned Behemoth site by Urban Sprawl. The construction and maintenance of a new housing development would supply many new jobs to the area and help to rebuild the weakened tax base. However, the city is not especially interested in Electra's new technology, and would prefer that Behemoth use conventional clean-up technology, regardless of the higher costs. The city agrees that litigation and regulatory problems would probably more than offset the shorter estimated decontamination time using ET's technology. However, Grimesville is open to the CUTS partnership concept, and would support it if the regulators and community citizens agreed.

Issues and Challenges:

Financial:

Behemoth has invested \$250,000 in Electra over the past year. Behemoth's stock price is hovering near an all-time low of \$4 per share, due in large part to having the five polluted properties appear on its books. The CEO and top company officers fear an unfriendly takeover of the company if the stock price is not relieved by the sale. This pressure is a primary motivator for Behemoth's interest in the ET technology which will expedite the decontamination and subsequent sale. However, Behemoth also faces the possibility of fines of \$50,000 per day from the Regional Water Quality Board unless remediation of the water is completed in five years.

Electra's technology looks very good, but there are severe obstacles. Potential litigation could drain Behemoth's cash reserve, which is currently very low. Convincing the regulators to approve the technology is another major obstacle. Behemoth is willing to invest more, if they can be convinced that they will recoup their investment based on lower costs of remediation and a shorter time frame.

Electra believes its technology is ready for testing. They are seeking letters of intent from other customers like Galaxy Business Machines, Choco Chips Semiconductors, and Awesome Aerospace. They are also seeking lab and university help in the planning and development of new applications. Additional financing is being sought to expand the technology into the following areas: mixed waste remediation in the drum; conversion of SO₂ and NO_x in exhausts from coal-burning plants to reduce acid rain; food irradiation; medical sterilization; and rapid curing of plastics.

Depending on requirements, Behemoth may have to employ BAD bacteria at greatly increased costs. They believe that either technology (Best Available Control Technology (BACT) or Electra) will clean the soil adequately (to a few parts per billion), but they are worried about more stringent regulations in the future.

Technology:

The main contaminants on site are TCEs from degreasers and solvents, which have sunk into the aquifer, and benzene, toluene, ethylene, and xylene from gasoline and diesel fuel, which have spread out and migrated in more horizontal paths. There is some question whether the 5-acre staging site for degreasing engines and parts can be completely remediated by the time construction is scheduled to begin in two years. Urban Sprawl is asking its designers to locate the shopping center parking lot on the worst part of the site. CUTS believes that Electra's technology will be adequate. However, as a backup, bioremediation with Restore's patented biologically accelerated decomposition (BAD) bugs should eventually break down all the TCEs under the blacktop surface.

Additional soil contamination was found on the half acre surrounding the underground gasoline storage site, and areas near the foundry. Electra plans on bringing VOCs and SVOCs to the surface through soil vapor extraction or thermal extraction, and treating the air stream with the electron beam to destroy the compounds. Electra's beam works at low pressures and generates very little heat. It requires less energy than many other methods, and produces only minor out gassing.

The groundwater is severely contaminated with TCEs. Electra claims its beam technology excels at remediating pollution in water. It can treat groundwater at a rate of 1800 gal. per minute. Approximately 1000 acre-feet of water will be pumped through the beam's unit and remediated.

If necessary, Electra will also plant BAD bugs in all contaminated areas after treatment with the beam to ensure thorough and continuing destruction.

CUTS has estimated the Grimesville site cleanup costs as follows:

		Electra	BACT	BAD (1 m deep)
Staging Site (25,000 lbs TCE/acre)	5 acres, 2 meters deep	\$1.0M	\$3.8M	(\$2.3M)
Gas Tank Site (5.8×10^4 lbs VOC/lb soil)	0.5 acres, 6 meters deep	\$0.3M	\$1.0M	(\$0.5M)
Additional low-level sites (5.8×10^5 lbs VOC/lb soil)	20 acres, 2 meters deep	\$0.3M	\$1.3M	(\$2.2M)
Aquifer	1000 acre-ft	\$1.1M	\$1.2M	
TOTALS		\$2.7M	\$7.3M	(\$5.0M)

Electra has filed four patent applications covering the process of using electron beams for the treatment of toxics, various hardware components and configurations. Two have been granted and two are pending.

Permitting:

The Air Management District is skeptical about Electra's technology. The chief permit engineer has requested a large amount of data to prove the technology works. He would prefer the job be done with the best available control technology (BACT). CUTS is currently lobbying both federal and state legislators, as well as the EPA, to implement both risk assessment procedures and performance-based criteria for permitting and using new technologies.

The president of Behemoth has often said that his customers ask him for a 7 Megawatt engine/generator set. They judge the equipment on its performance and reliability. They don't tell him how to build the engines and generators!

Siting:

Urban Sprawl very much favors the Behemoth site. They believe that successfully reclaiming this property will open the door to many other parcels of contaminated land that could be profitably developed. However, they will not wait forever for the Behemoth deal to be completed, and are exploring other sites and other communities. Some Grimesville citizens' groups have been actively lobbying Urban Sprawl to build in their neighborhoods. The mayor of Grimesville has been insisting that Urban Sprawl set aside 20% of the site for low-income housing, but Urban Sprawl is adamantly opposed to this.

Environmental Impact:

Some environmental groups want strong guarantees that the developed land will not become another Love Canal. They want assurances, preferably by trustworthy independent parties, that the reclaimed land will be habitable; they are not very concerned about which technology should be employed, nor about Behemoth's financial condition. Certain community activists are worried about the electron beam technology, and the by-product VOC emissions from Electra's process. They believe that the health of current neighbors of the Behemoth site could be impacted by this "dangerous" technology. Other groups favor cleaning up the site, but are opposed to the housing development. They want

to see the land set aside as a green belt, and are afraid that a housing development would increase auto traffic on their streets.

Timing:

Regulatory agencies have said that Behemoth must clean up its site by December 1, 2000, or face heavy fines. However, the agencies did not specify the target reductions.

Behemoth, like Big Oil Inc., is concerned that these target reductions may be unrealistically low. Behemoth is also involved in a Catch-22 situation. Conventional technologies would require six years for remediation; that means they could not meet the deadline. Electra's toolbox would probably work, if they can gain the permits they need quickly, and avoid extended litigation.

Foreign Involvement:

Electra is seeking other customers, both nationally and internationally. They would like to participate in an international consortium for environmental restoration, and are looking for additional partners and financing.

Consolidated Financial Statements
BEHEMOTH ENGINE COMPANY, Inc.

Income Statement
[\$ in millions]
for the year ended Dec 31, 1994

Operating Revenues from Sales	\$12
Operating Expenses	\$11
Salaries	3
Benefits	1
Selling Expense	5
Administrative	2
Net Income from Operations	\$1
Income Taxes	0
Net Income After Taxes	\$1

Balance Sheet
[\$ in millions]
as of Dec 31, 1994

Current Assets	\$115
Cash	2
Receivables	3
Property, Plant, Equip	90
Intangibles [Engine Patents]	12
Inventories	8
Current Liabilities	\$ 55
Accounts Payable	0
Notes Payable	5
Accrued Taxes Payable	0
Grimesville Foundry Clean-Up	50
Stockholder's Equity	\$60

Statement of Cash Position
[\$ in millions]
for the year ended Dec 31, 1994

Sources of Cash	
Net Income	\$1
Effects of changes in Operating Capital:	
Decrease in Accts Receivable	0
Decrease in Inventories	4
Increase in Accts Payable	0
Issuance of Common Stock-Additional Shares	0
Total Sources of Cash	\$ 5
Uses of Cash	
Dividends Declared and Paid	\$6
Change in Cash Position	(\$1)
Cash, Dec 31, 1993	\$3
Cash, Dec 31, 1994	\$2

Stock Position: 15 Million Shares outstanding	Market Value \$4.00/share	Book Value
\$4.00/share		
Dividends: \$0.40/share	P/E Multiple: 10	

Consolidated Financial Statements
ELECTRA TECHNOLOGIES, Inc.

Income Statement
[\$ in millions]
for the year ended Dec 31, 1994

Operating Revenues from Sales	\$5	
Operating Expenses	\$6	
Salaries	2	
Benefits	1	
Selling Expense		2
Administrative	1	
Net Income from Operations	(\$1)	
Income Taxes	0	
Net Income After Taxes	(\$1)	

Balance Sheet
[\$ in millions]
as of Dec 31, 1994

Current Assets	\$25
Cash	1
Receivables	0
Property, Plant, Equip	3
Intangibles [Electron Beam Technology]	20
Inventories	1
Current Liabilities	\$ 7
Accounts Payable	0
Notes Payable	7
Accrued Taxes Payable	0
Stockholder's Equity	\$18

Statement of Cash Position
[\$ in millions]
for the year ended Dec 31, 1994

Sources of Cash	
Net Income	(\$ 1)
Effects of changes in Operating Capital:	
Decrease in Accts Receivable	1
Increase in Inventories	(1)
Increase in Accts Payable	0
Issuance of Common Stock-Additional Shares	1
Total Sources of Cash	\$ 0
Uses of Cash	
Dividends Declared and Paid	\$0
Change in Cash Position	\$0
Cash, Dec 31, 1993	\$1
Cash, Dec 31, 1994	\$1

Stock Position: 9 Million Shares outstanding Market Value \$2.00/share Book Value \$2.00/share
Dividends: \$0.00/share P/E Multiple: Infinite

SUGGESTED EXAMPLES FOR GREEN TEAM REQUIREMENTS

For Restore, Inc.

Your cost estimates seem very low. What assurances can you provide that costs won't escalate as soon as a contract with the county is signed?

Initial capital costs are only part of the story. Prove that your operating costs will not be higher than current landfills.

Recycling has never been profitable. Prove that your recycling concepts will actually reduce the costs to the citizens for solid-waste disposal. What new technologies will be used to separate paper, plastics, glass, ferrous and nonferrous metals, putrescibles, etc.? Who are your customers for these recyclables?

Could your facility be modified to also treat sewage sludge? I hear that your competitors are developing a complete municipal waste system.

The San Manuel/Turkey River site is ridiculous. Besides incurring obvious environmental damage, you could not build the landfill below ground because of tides and high groundwater levels. Building above ground will block views and depress land values. Defend your selection of the estuary site over the much preferable site on the south side of town, or present a new proposal for the south-side site.

We applaud Restore's recognition of environmental justice, and their proposal to build the plant in neighborhoods other than ours (viz. the south side). However, we need indisputable proof that the salmon migration will not be damaged.

How many jobs will Restore actually provide? Will these be given to residents or to outsiders?

What will Restore contribute to the tax base? Will tax breaks eliminate all benefits to the city and county?

It is unusual to go from small-scale to a full demonstration facility. Prove (with computer models and/or testing) that you can safely skip the pilot-plant phase.

Can you demonstrate that your plant will meet all federal and state environmental laws and regulations from cradle to grave?

Have you prepared an Environmental Impact Statement? Will your facility meet future regulations as well as current ones?

Provide more data on your liner system. Convince us of its reliability. Does it exceed current RCRA requirements for municipal landfills?

How will a strong earthquake affect your facility?

How will you deal with extended rainstorms and flooding during the construction and operation phases of your landfill?

What about the existing contamination on the military base? Who will clean that up and who will pay? We even heard that unexploded ordnance exists on the base!

Who will be liable for future environmental damage? Will you establish an escrow account to pay for future problems? How much? What guarantees will you provide that this won't become another Love Canal?

Were the bacteria genetically engineered? What guarantee we have that these bacteria won't cause diseases?

For BABCO:

Will the promised jobs be given to residents or to outsiders? Are these high-paying jobs?

We're tired of technical snow jobs and unintelligible jargon. We want to know in plain English what all the risks are for your new plant.

How will a strong earthquake affect your facility?

How will you deal with extended rainstorms and flooding during the construction and operation phases of your facility?

What proof do you have that *Nirvana* can achieve the 200+ mile range that is coveted by the electric auto industry, at reasonable cost and with high reliability?

What are the differences between the cylindrical and flat plate prismatic configurations for the battery, and why do you favor the cylindrical design? Is the manufacture of one safer than for the other? What about operation? What about safety when I'm under the hood of my car...is this thing going to blow up in my face?

With all of your so-called advanced concepts in manufacturing, won't the battery cost so much that no one will buy it? This will result in shut-down of the factory and another dinosaur factory near our neighborhoods.

Your recycling process is new and unique. Prove that it really works! Small-scale laboratory tests are not necessarily valid, and we don't believe your computer models. You can make your computer say anything you want. Provide independent verification of your process.

What does "zero emissions" really mean? Are you trying to pull the wool over our eyes?

Prove that there will be zero discharge of pollutants into the water.

You claim zero discharge into the water, yet you then back off and say that the plant emissions are below current requirements. Why the double talk? What exactly are your emissions, how much and in what form?

Meeting current emission standards is not enough! There is new legislation pending that is more strict than the current standards. You must meet the pending legislation and any conceivable future legislation as well.

Why would Sludgeco buy your hazardous materials? Wouldn't they charge to handle them for you? What are you hiding from us?

What exactly is this "polyethylene oxide/dissolved organolithium salt electrolyte," and is it going to leak all over and contaminate things here and all over the country?

Why is the thin film application to fabrication of the polymer oxide so important to your process, and what happens if you can't perfect it? What are the safety issues?

You have an undisclosed acid leakage problem. What other undisclosed problems do you have? We will require a full environmental impact assessment report to be done before you can build this plant. The EIA must be done by an environmental specialist of our choosing, and you must pay for it.

What monitoring equipment will be used for checking air and water emissions? What will BABCO's liability be if they exceed their expected emissions levels?

For ROCAR:

We've never seen a demonstration or verification of your technology. Prove that the reduction in VOCs is really 10,000:1 as you claim.

Show that the system can operate automatically for long periods of time in an unattended mode without going out of environmental specs.

What kind of throughput will be required to destroy VOCs at escape points? Can your system really handle that volume?

Could the concentrator create highly volatile solutions from the less volatile ones, with potential toxic or explosive mixtures? What if the system should fail or leak at this point? Prove safety and zero environmental impact as a result of system failures.

There has been an increasingly sulfurous tinge to the sea breeze over the past years, which indicates that your sulfur problem is just as bad as the VOC problem. Upgrade your scrubbers to reduce your sulfur emissions by a factor of 10.

What is happening to the chlorides in the VOCs that you burn? Are they coming out as toxic chlorine gas? Maybe that's why everyone near an incinerator gets cancer.

Prove that you aren't generating any harmful compounds in your process. A small experiment won't convince me since it's a whole lot different than a refinery stack.

That high-temperature process of yours will kill some of us. It's giving off some sort of energy or radiation or something that isn't natural.

Show that the off-gas system sludge/waste streams are non-toxic or can be added back into Clohi for processing.

Don't raise my gas prices because of this new thing. It's your fault that you aren't cleaning it up well enough right now, so don't pass the cost on to me.

Make your system good enough that it will meet all future regulations as well as current ones. Agree to close the refinery if it doesn't.

This is nothing more than an incinerator, and it will spread ash all over our community. Prove that the Clohi process is not an incinerator or shut down the refinery.

Make your system emissionless.

If this is going to make CO₂, you're going to increase global warming. Find another way.

What are the potential consequences of the worst possible accident in lives and dollars?

For CUTS:

We have obtained an internal memo showing that greater than half the overall cost of remediation is for cleanup of the five-acre staging site. You're just trying to get out of it by using the electron beam technology. You can't put enough BAD bugs in the ground to eat tons of VOCs. Clean up the staging site using either the electron beam or old remediation technology.

Pouring solvents on the ground is inexcusable, especially for the last 40 years when good disposal methods have been available. Given this breach of public trust, you have no right to profit from sale of the land after nominal cleanup. We will seek to have all profits placed in trust for the additional cleanup years from now that will be necessary to fix problems that will inevitably occur.

If you poured stuff on the ground for so long here, you must be doing it at other sites. We call for a full investigation of your practices at all sites.

The electron beam technology ~~is~~unproven. Provide proof of concept and also detailed data on cleanup efficiencies.

The by-products of your process are not mentioned. Are you going to have some unknown gas spewing into the atmosphere in our neighborhoods. Define your by-products and how they will be contained and properly disposed of. They could be worse than what is there now.

There is no proof that the Restore BAD bug technology works. Provide this.

This new technology ~~is~~unproven, and will certainly cost more than is estimated. Use the old proven technology.

Treating the groundwater and top levels of soils are fine. But there's no way you can reach the deep soils just above the aquifer. So we're still going to get more carcinogens in the groundwater. What are you going to do about it?

Prove that the electron beam technology works for water pollution, and that your throughput is enough to handle the problem.

We don't believe you can clean the ground good enough for ~~peopl~~ live there. In just a few years we will have stuff coming to the surface that will harm the residents. Prove that the land will be habitable.

APPENDIX A: LIST OF PLAYERS

NAME	TITLE & CO.	ADDRESS	PH./FAX	TEAM
Blue-1: RESTORE				
Mukesh Ahuja	Pres., Envirosoft	1830 Bering Dr., Suite 1, San Jose, CA 95112	408-437-9449 408-437-5670	Blue-1
Dorothy FisherAtwood	Dir. of Env. Services, EMCON	15055 SW Sequoia Pkwy, Suite 140, Portland, OR 97224	503-624-9200 503-620-7658	Blue-1
Stan Drake	Pres., Energy Tactics, Inc.	124 Sills Rd., P.O. Box 7, Yaphank, NY 11980	516-924-5300 516-924-5627	Blue -1
Dan Flynn	Pres., Environmental Technology Systems	1830 Bering Drive., Suite 8, San Jose, CA 95112	408-441-0721 408-437-5670	Blue-1
Bruce Gritton	Monterey Bay Aquarium Res. Inst.	160 Central Avenue, Pacific Grove, CA 93950	408-647-3733 408-649-8587	Blue-1
Mark W. Hooper	Owner, Connemara Corporation	1823 Round Lake, Houston, TX 77077	713-785-9732 713-785-9736	Blue-1
David P. Lazzarini	V.P. Gibson Speno Co.	1731 Technology Dr, Suite 340, San Jose, Ca 95110	408-436-7100 408-436-7140	Blue-1
Jeffery L. Yarne	Pres., Yarne & Assoc.	1611 Borel Place, Suite 200, San Mateo, CA 94402	415-574-1030 415-574-6850	Blue-1
Cecelia V. Williams	Sandia National Laboratories	MS0719, P.O. Box 5800, Albuquerque, NM 87185-0719	505-844-5722 505-844-0543	Blue-1 Facilitator
Jeff Newman	Office of Strategic Tech	CA Trade & Commerce, 200 E. Del Mar Blvd., #204, Pasadena, CA 91105	818-568-8629 818-568-9962	Blue-1 AnalystRec
Blue-2: BABCO				
Ron K. Advani	Sr., V.P. & Regional Mgr., CH2M Hill, Inc.	1111 Broadway, Oakland, CA 94607	510-251-2426 510-893-8205	Blue-2
Albert J. Keicher	Prog. Mgr., Sun-Earth Interface	1465 Dana Avenue, Palo Alto, CA 94301	415-323-1691	Blue-2
Donald A. Lees	Exec. V.P., California AETC	19410 Cabot Blvd., Hayward, CA 94545	510-782-7000 510-782-7634	Blue-2
Ambrose Manikowski	G & A Associates	1830 Bering Drive, Suite #6, San Jose, CA 95112	408-441-0541 408-441-0542	Blue-2
Thomas A. Mowles	SOLARWATT	P.O. Box 60638, Palo Alto, CA 94306	415-325-5191 415-437-5670	Blue-2
Albert H. Myers	Chairman, Clean Air Fuels Corporation	1945 Las Plumas, San Jose, CA 95133	408-259-5710 408-259-9632	Blue-2
Richard C. Ragaini	Lawrence Livermore National Laboratory	7000 East Avenue, L-626, Livermore, CA 94551	510-423-2233 510-423-9987	Blue-2
Dave Wilson	Env. Liaison Proj. Coordinator	East Bay Conversion & Reinvestment Commission, 530 Water St., 5th floor, Oakland, CA 94607	510-272-4850 510-834-6928	Blue-2

Gary J. Sycalik	Innovative Futures Corporation	P.O. Box 429, Pine, CO 80470	303-838-1627 303-838-9547	Blue-2 Facilitator
LeAnn Miller	Sandia National Laboratories	MS1175, P.O. Box 5800, Albuquerque, NM 87185-1175	505-844-3772 505-845-7763	Blue-2 AnalystRec
Blue-3: ROCAR				
Prof. Anne Lawrence	Prof. of Organization and Management	College of Business, San Jose State University, San Jose, CA 95192-0070	408-924-3586 408-924-3555	Blue-3 Big Oil
Peter Melhus	Dir., Pacific Gas & Electric	P.O. Box 770000, B24F, San Francisco, CA 94177	415-973-1466 415-974-5939	Blue-3 Big Oil
Gary M. Noland	G & A Associates	1830 Bering Drive, Suite 6, San Jose, CA 95112	408-441-0540 408-437-5670	Blue-3 Big Oil
John T. Schofield	Pres. & CEO, Thermatrix, Inc.	3590 N. First Street, San Jose, CA 95134	408-944-0220 408-944-0292	Blue-3 Big Oil
Russell L. Cole	Pres./CEO, Clean Air Fuels Corp.	1945 Las Plumas Ave., San Jose, CA 95133	408-259-5710 408-259-9632	Blue-3 Clohi
Peter R. Morton, PhD	Dir. Of Chemical Research, AquaEss	1830 Bering Drive #3, Suite #21, San Jose, CA 95112	408-453-3012 408-437-5670	Blue-3 Clohi
Steve Oster	V.P./ R & D	Ionization Research, 1830 Bering Dr., Suite 9, San Jose, CA 95112	408-453-3898 408-298-5430	Blue-3 Clohi
Chittoor V. 'Subra' Subramanian	Mgr, Small Business Technology Transfer	Sandia National Laboratories, MS 9141, PO Box 969, Livermore, CA 94551-0969	510-294-2311 510-294-3389	Blue-3 Clohi
Tsuneyuki Ueki	Mgr., Ebara Corp.	1-6-27 Kobnan, Minato-ku, Tokyo 108 Japan	03-5461-6852 03-5461-6081	Blue-3 Clohi
James L. Jorgensen	Sandia National Laboratories	MS0954, P.O. Box 5800, Albuquerque, NM 87185-0954	505-844-1023 505-844-5422	Blue-3 Facilitator
Ted Wheelis	Sandia National Laboratories	MS0730, P.O. Box 5800, Albuquerque, NM 87185-0730	505-845-9298 505-844-1723	Blue-3 AnalystRec
Blue-4: CUTS				
Alan L. Barich	Tritium, Inc.	607 Almond Avenue, Los Altos, CA 94022	415-949-4129 415-949-4167	Blue-4 Behemoth
Lucia M. Cha-Yu	Pres., Castro Valley Properties, Inc.	525 University Ave., Suite 1500, Palo Alto, CA 94301	415-326-6480 415-325-4762	Blue-4 Behemoth
Joe L. Iovenitti	Principal Geologist, Weiss Associates	5500 Shellmound Street, Emeryville, CA 94608-2411	510-450-6141 510-547-5043	Blue-4 Behemoth
Andy Michael	Ctr for Economic Conversion	222 View Street, Mountain View, CA 94041	415-968-8798 415-968-1126	Blue-4 Behemoth
Peter T. Boissiere	President, BEAR Inc.	14005 Sunglow Rd. NE, Albuquerque, NM 87123	505-271-2010 505-271-2030	Blue-4 Electra
Gail D. Brownell	Env. Mgr., HewlettPackard Co.	350 West Trimble Road, San Jose, CA 95131	408-435-4183 408-435-4155	Blue-4 Electra
Barrett A. Johnson	Pres., Ceramic Bonding, Inc.	939 San Rafael Ave., Suite D, Mountain View, CA 94043	415-940-1146 415-940-1634	Blue-4 Electra

Benjamin R. Roberts	VP-Environmental Technologies	Omega Environmental, Inc., 820 Laverne Way, Los Altos, CA 94022	415-948-1282 415-948-9644	Blue-4 Electra
Stephen M. Matthews	Lawrence Livermore National Laboratory	Mail Code L-530, Box 808, Livermore, CA 94550	510-423-3052 510-654-1181	Blue-4 Electra
Don Schroeder	Sandia National Laboratories	MS0985, P.O. Box 5800, Albuquerque, NM 87185-0985	505-845-8409 505-844-5916	Blue-4 Facilitator
Kathleen Schulz	Sandia National Laboratories	MS0738, P.O. Box 5800, Albuquerque, NM 87185-0738	505-845-9879 505-844-1723	Blue-4 AnalystRec
Green-E: ENVIRONMENTALISTS				
Robert A. Crandall	Sr Technical Policy Analyst - CETC (also DTSC)	California Environmental Technology Center, 8834 Hollowstone Way, Sacramento, CA 95828	916-255-3777 916-255-3595	Green-E
Barry Dearmond	Pacific Warehouse & Cartage	3129 Corporate Place, Hayward, CA 94545	510-487-6026 510-487-6064	Green-E
Joan H. Holtzman	Assoc. Director	Center for Economic Conversion, 222 View St., Mountain View, CA 94041	415-968-8798 415-968-1126	Green-E
Gail Humphreys	Community Env. Council	930 Miramonte St., Santa Barbara, CA 93109	805-963-0583 805-962-9080	Green-E
Richard Morrison	Sr. V.P., Bank of America	Env. Policies & Programs P.O. Box 37000, #5800, San Francisco, CA 94137	415-622-8144 415-622-8177	Green-E
Gary Patton	Gen. Counsel, Planning & Conservation League	926 J. Street, #612, Sacramento CA 95814	916-444-8726 916-448-1789	Green-E
Andrea Wilson	Green Earth Office Supply	P.O. Box 719, Redwood Estates, CA 95044	408-353-1346	Green-E
Bill McCulloch	Sandia National Laboratories	MS0405, P.O. Box 5800, Albuquerque, NM 87185-0405	505-845-8696 505-844-8867	Green-E Facilitator
Gladys Shaw	Sandia National Laboratories	MS0127, P.O. Box 5800, Albuquerque, NM 87185-0127	505-845-9488 505-844-0619	Green-E Recorder
Green-P: PUBLIC				
Richard L. Keeler	Deputy Dir., CA Trade & CommAgcy	200 E. Del Mar Blvd., Suite 204, Pasadena, CA 91105	818-568-3068 818-568-9962	Green-P
Elizabeth T. Meltzer	Bd Mbr: Peninsula Conservation Ctr.	1241 Dana, Palo Alto, CA 94301	415-327-7911	Green-P
Loretta Riddle		100 Paseo de San Antonio, Suite 209, San Jose, CA 95113	408-286-8318 408-286-2338	Green-P
Raymond J. Tompkins	Tompkins & Williams Health & Educ. Cons.	215 Randolph Street, San Francisco, CA 94112	415-333-4080 415-333-2278	Green-P
Sally Jo Webb	Sunnyvale, CA	518 Crater Lake Ct., Sunnyvale, CA 94087	408-732-5635 408-730-5076	Green-P
Victor R. Weisser	Pres., CA Council for Env. & Economic Balance	100 Spear Street, Suite 805, San Francisco, CA 94105	415-512-7890 415-512-7897	Green-P

Donald E. Jones	Sandia National Laboratories	MS1380, P.O. Box 5800, Albuquerque, NM 87185-1380	505-271-5519 505-271-4202	Green-P Facilitator
Gordon T. Longerbeam	Lawrence Livermore National Lab	P.O. Bpx 808, L-437, Livermore, CA 94550	510-423-7293 510-422-6242	Green-P Analyst-Rec
Green-R: REGULATORS				
James T. Allen, PhD	Cal/EPA	P.O. Box 806, Sacramento, CA 95812-0806	916-322-2822 916-327-4494	Green-R
John Blevins	USEPA Region 9	75 Hawthorne, MSH71, San Francisco, CA 94105	415-744-2400	Green-R
Lynne T. Edgerton	CA Air Resources Board	400 So. Plymouth Blvd., Los Angeles, CA 90020	213-937-0947 213-965-0688	Green-R
Paul M. Giardina	Dir., Santa Clara Valley Permit Asst Ctr.	CAL-EPA, 1830 Bering Drive, Suite 15, San Jose, CA 95112	408-437-3621 408-437-5670	Green-R
Dave Jones	Common Sense Initiative, USEPA Region 9	75 Hawthorne, MSH1, San Francisco, CA 94105	415-744-2266	Green-R
Gary M. Nolan	Santa Clara County Pollution Prev. Prog.	1735 North First Street, Suite 275, San Jose, CA 95112	408-441-1195 408-441-0365	Green-R
Michael A. O'Hagan	Tritium, Inc.	10313 E. Estates Drive, Cupertino, CA 95014	408-257-4890 408-257-4892	Green-R
Bill Robberson	USEPA Region 9	75 Hawthorne, MSW61, San Francisco, CA 94105	415-744-1857	Green-R
George Robin	USEPA Region 9	75 Hawthorne, MSW-6-3, San Francisco, CA 94105	415-744-1819	Green-R
Jeff Zelikson	Director, Waste Mgmt Div. USEPA, Region 9	75 Hawthorne, MSH1, San Francisco, CA 94105	415-744-1730	Green-R
Jennifer E. Nelson	Sandia National Laboratories	MS0719, P.O. Box 5800, Albuquerque, NM 87185-0719	505-845-8348 505-844-0543	Green-R Facilitator
George C. Allen	Sandia National Laboratories	MS0756, P.O. Box 5800, Albuquerque, NM 87185-0756	505-844-9769 505-844-0968	Green-R Analyst-Rec
Purple Team: CUSTOMERS				
Fran David	Chief of Staff, Council Member	505 14th Street, City Hall, Oakland, CA 94612	510-238-3266 510-562-4473	Purple
Bruce L. Kern	County of Alameda	Office of Economic Development, 1221 Oak Street, Suite 555, Oakland, CA 94612	510-272-3874 510-272-3784	Purple
Edward W. C. Leung	Mgr., Env. H & S, General Electric	175 Curtner Avenue, M/S902, San Jose, CA 95125	408-925-1940 408-925-2421	Purple
Neil S. Mayer	Dir of Comm. Dev., City of Berkeley	1039 Sierra St., Berkeley, CA 94707 Home (On 1/20 will be private consultant)	510-525-8507 510-644-8678	Purple
Dr. Robert Pfahl	Dir. of Mfg. & Env. Tech. Assesment, Motorola	1301 E. Algonquin Rd., Room 1014 Schaumburg, IL 60196	708-576-5102 708-576-2111	Purple

Greg Pitts	Dir., Env. Prog., MCC Corp.	3500 WestBalcones Center Dr., Austin, TX 78759-5398	512-338-3790 512-338-3814	Purple
Dr. Richard L. Reisenweber	V.P., Environment RockwellInt'l.	P.O. Bx 4250-2201 Seal Beach Blvd., Seal Beach, CA 90740-8250	310-797-2975 310-797-1500	Purple
Daniel I. Wilkowsky	Dir., Env. & Safety ServicesNat'l Semiconductor	2900 Semiconductor Dr., 10-460, Santa Clara, CA 95051	408-721-3354 408-721-3353	Purple
Kristi Boom	Sandia National Laboratories	MS0954,P.O. Box 5800, Albuquerque, NM 87185-0954	505-844-2814 505-844-7857	Purple Facilitator
Susan Barich	Assoc. Dir.,Env. Partnership	1830 Bering Dr., Suite 13, San Jose, CA 95112-4212	408-452-1621 408-437-5670	Purple Analyst-Rec
Red-F: FINANCIAL				
Tom Anyos	President, The Technology Group	63 Linden Ave.,Atherton, CA 94027-2161	415-323-3448 415-323-3483	Red-F
BeverlyBendicksen	Dir. Inv. & Venture Funding, TVC	1601 Randolph Rd., SE, Suite 220, Albuquerque, NM 87106	505-246-2882 505-246-2891	Red-F
Ted D. Briggs	Environmental Partnership	1830 Bering Drive, Suite 13, San Jose, CA 95112-4212	415-456-1621 408-437-5670	Red-F
Tapan Munroe	Chief Economist, PG&E	123 Mission St., Room 2812, San Francisco, CA 94108	415-973-8984	Red-F
Carolita L. Oliveros	Decisions Investments Corp.	P.O. Box 689, Oracle, AZ 85623	602-825-6419 602-825-6471	Red-F
Dag Syrrist	VP, Technology Funding	2000 Alameda de LasPulgas, Suite 250, San Mateo, CA 94403	415-345-2200 415-341-1400	Red-F
Robert L. Post	Consultant	11417 Sunset Hills Rd., Suite 106Reston, VA 22090	703-471-4819 703-709-9466	Red-F F/A/R
Red-J/L: JUDICIAL/LEGAL				
Robert C.Barrett	Dispute Resolution Services	P.O. Box 7510, Menlo Park, CA 94026-7510	415-854-2505 415-854-2495	Red-J/L
Susan R.Brechbill	Chief Counsel, DOE	DOE, Richland Operations Office, PO Box 550, A4-52, Richland, WA 99352	509-376-7311 509-376-4590	Red-J/L
Mark D. Cowan	Vice Chairman, Cassidy & Assoc.	700 13th St., NW, Suite 4000, Washington, DC 20005	202-879-0395 202-347-0785	Red-J/L
Walter V. Hays	Attorney & Mediator	355 Parkside Drive, Palo Alto, CA 94306	415-424-9633 415-493-8966	Red-J/L
Jennifer L. Hernandez	Env. Atty, Beveridge & Diamond	One Samson Street, Suite 3400, San Francisco, CA 94101	415-397-0100 415-397-4238	Red-J/L
Darcelle Mattson	Harding Lawson Assoc., Sr.Env. Specialist	105 DigitalDr, PO Box 6107, Novato, CA 94948	415-884-3322 415-884-3300	Red-J/L

Janet G. Tulk	Laboratory Counsel	Lawrence Livermore Nat'l. Lab, 7000 East Ave., MS L-701, Livermore, CA 94550	510-423-7123 510-423-8529	Red-J/L
Taz Bramlette	SNL/CA, Env. Enterprise	MS9053, P.O. Box 969, Livermore, CA 94550-0969	510-294-2299 510-294-1559	Red-J/L Facilitator
Linda Bagneschi	Silicon Valley Env'l Partnership	1830 Bering Dr., Suite #13, San Jose, CA 95112	408-452-1621 408-437-5670	Red-J/L Analyst-Rec
Red-L: LEGISLATIVE TEAM				
Elaine Alquist	San Jose	100 Paseo de San Antonio, Suite 209, San Jose, CA 95113	408-286-8318 408-286-2338	Red-L
Lawrence C. Grossman	V.P., Cassidy & Assoc.	700 13th Street, NW, Suite 4000, Washington D.C. 20005	202-879-0324 202-347-0785	Red-L
Doug Henton	Joint Venture: Silicon Valley Network	99 Almaden Blvd., Suite 620, San Jose, CA 95113-2002	408-271-7211 408-271-7214	Red-L
Loren Kaye	Undersecretary, CA Trade & Commerce	801 K Street, Suite 1700, Sacramento, CA 95814	916-324-9775 916-323-2887	Red-L
Greg E. Larson	Gen. Mgr., Planning & Development	City of Scottsdale, 7447 E. Indian School Road, Scottsdale, AZ 85252-1000	602-994-2322 602-994-2672	Red-L
Gib Marguth	SNL/CA	MS9108, P.O. Box 969, Livermore, CA 94550-0969	510-294-2302 510-294-3389	Red-L
Kim Walesh	Joint Venture: Silicon Valley Network	99 Almaden Blvd., Suite 620, San Jose, CA 95113-2002	408-271-7212 408-271-7214	Red-L
Deborah Belasich	Sandia National Laboratories	MS1380, P.O. Box 5800, Albuquerque, NM 87185-1380	505-271-7847 505-271-7867	Red-L Facilitat-Anal
Connie Nenninger	Sandia National Laboratories	MS0127, P.O. Box 5800, Albuquerque, NM 87185-0127	505-844-2146 505-844-1218	Red-L Recorder
Red-M: MEDIA				
Deborah L. Clark	Sr. Research, Director of Communications	Institute for Sustainable Development 3000 Sand Hill Rd, Bldg 3, Suite 125, Menlo Park, CA 94025	415-854-5510 415-854-2330	Red-M
Chuck Woolsey	Sandia Electronic Communications	MS0947, Org. 12662, Sandia National Laboratories, Albuquerque, NM 87185	505-844-3931 505-844-3268	Red-M F/A/R
Yellow Team: SUPPLIERS				
K. C. Bishop	Senior Consultant	1201 K Street, Suite 1910, Sacramento, CA 95814	916-441-3638 916-441-5031	Yellow
Len A. Hiles	Dir., Electronic & Mech. Eng., SNL/CA	P.O. Box 969, MS9105, Livermore, CA 94551-0969	510-294-2962 510-294-2158	Yellow
Robert Johnson	Lawrence Berkeley Lab/UC	1 Cyclotron Rd., MS50A-4119, Berkeley, CA 94720	510-486-4920 510-486-4553	Yellow

Patricia M. Kearney	Pres., PMK Assoc., Inc.	1828 L Street,N.W., Suite 402, WashingtonD.C. 20036	202-775-7232 202-296-9555	Yellow
Lora Lee Martin	Dir., Prog/PolicyDev., UC-FortOrd Project	University of California, 269 Applied Sciences, Santa Cruz, CA 95064	408-459-3652 408-459-5239	Yellow
Robert N.Schock	Dep. Assoc. Dir., Energy	Lawrence Livermore National LabP.O. Box 808, MS L-640, Livermore, CA 94550`	510-422-6199 510-423-0618	Yellow
Louis E. Stout	IT Corporation	4585 Pacheco Blvd., Martinez, CA 94553	510-372-9100 510-372-5220	Yellow
Mary L. Tucker	Mgr., Env. Services Department	777 N. 1st Street, Suite 450, San Jose, CA 95112	408-277-2993 408-277-3606	Yellow
Bill Moye	DeLaPorte & Assoc.	12015 Mountain Rd, NE, Albuquerque, NM 87112	505-298-1787 505-298-2302	Yellow Facilitator-Ana
Kristy Savage	Staff Sec.,Sandia National Laboratories	MS1368,P.O. Box 5800, Albuquerque, NM 8718501368	505-271-7936 505-271-7903	Yellow Recorder
CONTROL TEAM				
Cheryl L. Mitchell	Sec., Sandia National Laboratories	MS1151,P.O. Box 5800, Albuquerque, NM 87185- 1151	505-845-3035 505-845-3668	Control
V. Alan Mode	Lawrence Livermore National Laboratory	LLNL, Livermore, CA 94948	510-423-6856 510-422-0096	Control
Dr. Kevin W.Boyack	SMTS,Sandia National Laboratories	MS1151,P.O. Box 5800, Albuquerque, NM 87185- 1151	505-845-3183 505-845-3668	Control
Dr. Marshall Berman	Mgr., Sandia National Laboratories	MS1151,P.O. Box 5800, Albuquerque, NM 87185- 1151	505-845-3141 505-845-3668	Game Director

APPENDIX B: GAME SCHEDULE

Wednesday, March 29, 1995

- 5:00 pm Participant registration and badging at Learning Center registration counter; collect materials.
- 5:30 pm Players gather in Conference Center, J-101/102; get acquainted with team members; go to assigned tables.
- 6:00 pm Welcome: Silicon Valley Environmental Partnership-Ted Briggs
- 6:15 pm Dinner with your team members.
- 7:00 pm Prosperity Game briefing/overview with questions and answers; Innovator polling (Marshall Berman -- Game Director)
- 8:00 pm Formal meeting adjourned. Private team meetings and inter-team negotiations may begin. Green Teams may begin to develop their list of "requirements."

Thursday, March 30, 1995

- 7:30 am Continental Breakfast in Conference Center

SESSION 1 - March 30, 1995:

- 8:00 am Welcome: Joint Venture Silicon Valley Network, Becky Morgan
- 8:15 am Players go to assigned tables.
Control Team provides appointment schedules for Blue Team presentations to Green Teams in Sessions 2-5.
Facilitators lead teams in initial assignments:
Blue, Green, Purple, Yellow Teams Define member roles and responsibilities. Develop plans and strategies; make appointments with other teams; preliminary negotiations.
Green Teams Define member roles and responsibilities. Green-R must divide into separate regulatory agencies representing national, state, and regional agencies. Green-E and Green-P: Determine no more than two requirements for each Blue Team; Green-R: Determine three requirements from ~~the~~ **different** regulatory agencies; prepare written descriptions.
Red-Media Team Dispatch reporters as desired; start on first news release.
Red-Judicial/Legal Team Determine roles. Develop a policy paper on ways to improve the environmental litigation process. Develop a process to avoid

conflicts of interest if suits are filed. Begin offering your legal services to any team wanting them; set realistic prices.

Red-Legislative Team Determine roles. Begin debate on legislative bills in hopper. Amend bills or present new.

Red-Financial Team Decide on member's roles (banker, venture capitalist, etc.). Discuss innovative methods for financing projects. Begin meetings with Blue Teams to discuss investments.

Yellow Team Decide on roles, groundrules, services to be provided and reasonable costs. Divide up tasks and begin play.

Purple Team Elect mayors for San Manuel and Grimesville, and other officials as desired. Select CEO for Urban Sprawl Development Corporation. Decide on representatives for other potential customers of the four Blue Teams. Discuss division of available funds.

9:30 am **Green Teams provide written requirements for Control Team to distribute.**

9:45 am **Requirements delivered and posted** Blue Teams prepare their first presentations; continue negotiations; prepare written contracts where appropriate. All other teams: develop strategies; plan negotiations and contracts; collect information.

10:30 am Break. Coffee, tea, soda in Gallery.

SESSION 2 - January 1, 1996:

10:45 am KarmaKards distributed to Blue and Green Teams.
Assess current status (January, 1996).

10:55 am Blue Teams make first presentations to assigned Green Teams as scheduled and continue to prepare subsequent presentations for other Green Teams. Negotiations continue; new agreements and activities pursued.
All teams: inform Control of pending lawsuits to schedule court times.
All teams select a player who will present the teams' results and analysis in the closing session **Provide names to Control.**
Lawsuits, legislative hearings, etc. proceed all day as needed.

12:00 pm Buffet Lunch

12:15 pm TV/Radio news broadcast No. 1 (3 minutes)

12:45 pm Continue Session 2.

SESSION 3 - January 1, 1997:

1:30 pm KarmaKards distributed to Blue and Green Teams.
Assess current status (January, 1997).

1:40 pm Blue Teams make second presentations to assigned Green Teams; from this point on, the meetings should be scheduled by the Blue and Green teams themselves. Continue to prepare subsequent presentations to other Green Teams. Negotiations continue; new agreements and activities pursued.
All teams: inform Control of pending lawsuits to schedule court times.

SESSION 4 - January 1, 1998:

2:45 pm KarmaKards distributed to Blue and Green Teams.
Assess current status (January, 1998).

2:55 pm **Teams deliver suggested topics for National Environmental Summit Meeting to Control team. Select delegates to the Summit to represent each team.** Blue Teams make third presentations to assigned Green Teams; continue to prepare subsequent presentations to other Green Teams. Negotiations continue; new agreements and activities pursued.
All teams: inform Control of pending lawsuits to schedule court times.

4:00 pm TV/Radio news broadcast No. 2 (2 minutes)

4:05 pm **National Environmental Summit Meeting.**

5:00 pm End of Session 4 and Day's Activities

5:30 pm Beer and Wine Reception in Gallery

6:00 pm Banquet Dinner in Conference Center

6:45 pm Dinner Speaker: Felicia Marcus: "Challenges and Joys of Collaboration: Calling On Our Better Angels"

7:45 pm Adjourn

Friday, March 31, 1995

7:30 am Continental Breakfast. Players go to assigned tables.

SESSION 5 - January 1, 1999:

8:00 am KarmaKards distributed to Blue Teams only.
Assess current status (January, 1999).

8:10 am Blue Teams make fourth presentations to assigned Green Teams; prepare subsequent presentations for revisiting those Green Teams that have not granted certifications for all requirements; schedule revisits to those teams. Negotiations continue; new agreements and activities pursued.
All teams: inform Control of pending lawsuits to schedule court times.

10:00 am Break.

10:15 am	TV/Radio news broadcast No. 3 (2 minutes).
	SESSION 6 - January 1, 2000:
10:30 am	Assess current status (January, 2000).
10:40 am	Blue Teams revisit Green Teams for second presentations. Negotiations continue; new agreements and activities pursued. All teams: inform Control of pending lawsuits to schedule court times.
12:00 pm	Lunch
12:45 pm	Schedule and complete all presentations, lawsuits, legislative requests, etc.
1:30 pm	Play ceases; status of all teams and negotiations delivered to Control. Teams prepare review graphs for final debriefing.
2:00 pm	Final TV/Radio news broadcast (5 minutes).
2:05 pm	Plenary Session: Designated players from every team present their observations and analyses (7-10 minutes each).
4:30 pm	Final briefing and analysis; final scores. Final Innovator Polling.
5:00 pm	Game adjourned

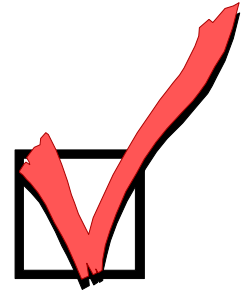
APPENDIX C: SAMPLE BALANCE SHEET

BLUE TEAM - SAMPLE ENTREPRENEURIAL BALANCE SHEET						
Session	Description of Transaction	Requirements overcome	Debt	Debit	Credit	Balance
				Millions	Millions	Millions
1	Initial Funds				\$10.00	\$10.00
1	Contract with Yellow (lab) for product testing; product fails			\$1.20		\$8.80
2	Grant from Purple (customer) for further development	REG-1			\$2.00	\$10.80
2	Karma Kard: Win \$1M				\$1.00	\$11.80
3	File lawsuits on two denied regulatory requirements (win one and lose one)	REG-2		\$2.00		\$9.80
3	Karma Kard: Fined for polluting			\$1.00		\$8.80
3	Contract with Yellow for further product R&D to overcome one requirement	REG-3		\$3.00		\$5.80
4	Seek two arbitrations; lose both			\$1.00		\$4.80
4	Karma Kard: Pay facility damages	PUB-1		\$1.00		\$3.80
5	Environmentalists sue you for ignoring two requirements; you lose both suits	ENV-1		\$2.00		\$1.80
5	Karma Kard: You are fined an additional \$1M			\$1.00		\$0.80
5	Borrow \$10M from bank to stave off bankruptcy; pay 20% interest over game period		\$12.00		\$10.00	\$10.80
5	Purchase additional R&D from Yellow; research is successful			\$1.00		\$9.80
6	File suits on remaining two requirements (win one, lose one)	ENV-2		\$2.00		\$7.80
6	Seek passage of new law to overcome one requirement; succeed	REG-4		\$0.10		\$7.70
6	Karma Kard: Exchange player with regulator team					\$7.70
6	Pass all requirements; Purple makes major purchase of product- \$13M	PUB-2			\$13.00	\$20.70
	Totals =		\$12.00	\$15.30	\$36.00	\$8.70

APPENDIX D: BLUE TEAM BALANCE SHEETS

BLUE TEAM - ENTREPRENEURIAL BALANCE SHEET						
Session	Description of Transaction	Requirements overcome	Debt	Debit	Credit	Balance
			Millions	Millions	Millions	Millions
1	Initial Funds				\$10	\$10
1						
2	KarmaKard:					
2						
3	KarmaKard:					
3						
4	KarmaKard:					
4						
5	KarmaKard:					
5						
6	KarmaKard:					
6						
	Totals =		\$0	\$0	\$0	\$0

APPENDIX E: REQUIREMENT FORM



REQUIREMENT COMPLETION FORM

THE FOLLOWING REQUIREMENT WAS ESTABLISHED BY GREEN TEAM _____ FOR BLUE TEAM _____:

BLUE TEAM PRESENTATION IN RESPONSE TO REQUIREMENT NO. ____:

Requirement ☐ Passed

☐ Did not pass

Signed--Designated Blue Team Member _____ Time _____

Signed--Designated Green Team Member _____ Time _____

Received by: _____
Control Team

Date

Time

APPENDIX F: AGREEMENT FORM



AGREEMENT

THE FOLLOWING TERMS AND CONDITIONS HAVE BEEN NEGOTIATED AND AGREED TO BY:

NAME OF TEAM & _____
NAME OF TEAM

NAME OF TEAM & _____
NAME OF TEAM

ON _____
DATE

THE TERMS AND CONDITIONS OF THIS AGREEMENT ARE AS FOLLOWS

Funds of \$_____ transferred to _____ from _____

Investment was ☐ Successful ☐ Unsuccessful

Signed--Designated Team Member Time _____ Signed--Designated Team Member Time _____

Signed--Designated Team Member Time _____ Signed--Designated Team Member Time _____

Received by: _____
Control Team Date _____ Time _____

APPENDIX G: FORM FOR RECORDING COURT DECISIONS

[illegible]

APPENDIX H: BUSINESS PLAN TO ASSIST NEGOTIATIONS WITH FINANCE TEAM

Proposed Investment: Description and total cost of investment. Amount of total cost to be borrowed.

Justification: Provide a justification for the investment, including how risk has been addressed. Benefits to the company? How it fits into the total corporate strategy? Why will this investment be successful?

Proposal to Finance Team: Estimate the total investment and sources of funding required to accomplish the above objectives.

Bank loan (Finance Team)	\$
Venture capital (Finance)	\$
Internal company financing	\$
Total estimated cost of investment	\$

Estimated Income From Investment Show the **incremental** effect of the investment on the income statement of the company. Variable costs include all other; e.g., labor, materials, depreciation.

	1996	1997	1998	1999	2000
Gross revenue from investment					
Interest on bank loan (if any)					
Variable costs					
Taxes					
Net income after taxes					

Additional Comments:

APPENDIX I: SOME ENVIRONMENTAL BACKGROUND INFORMATION

from “*EPA Environmental Technology Initiative: FY1994 Program Plan*,” USEPA, EPA 543-K-93-003, January 1994:

“The focus of this activity will be long-term research and pollution prevention by EPA, other Federal agencies, and the private sector. The goal is to develop more advanced environmental systems and treatment techniques that can yield environmental benefits and increase exports of “green” technologies. This investment will aid in the transition away from a defense-oriented economy, by stimulating the increased use of private sector R&D resources for environmental quality-related purposes.”

“The *U.S. EPA Technology Innovation Strategy (EPA/542/K-93/002)* outlines four strategic approaches through which EPA intends to accomplish the President’s goals:

1. Adapt EPA’s policy, regulatory and compliance framework to promote innovation;
2. Strengthen the capacity of technology developers and users to succeed in environmental technology innovation;
3. Strategically invest EPA funds in the development and commercialization of promising new technologies; and
4. Accelerate diffusion of innovative technologies at home and abroad.”

“... EPA will attempt to bring the benefits of pollution prevention to small businesses by acting as a convener and partner, a collaborator in technology diffusion, and an educator.”

“IMPROVING COMPETITIVENESS OF U.S. ENVIRONMENTAL TECHNOLOGIES:

The U.S. Technology for International Solutions (U.S. TIES) is an inter-agency technology diffusion program designed to enlist greater participation of the U.S. private sector in achieving U.S. environmental objectives overseas....”

“CLEAN TECHNOLOGY USE BY SMALL BUSINESS:

EPA should lead by “steering” more than “rowing” in the planning, development, commercialization, and diffusion of technology; and EPA should, in addressing the barriers to small business achievement of cleaner technology, emphasize approaches that increase partnering, collaboration, and leveraging.”

From “EPA Technology Innovation Strategy,” External Discussion Draft, USEPA, EPA 543-K-93-002, January 1994:

“SUMMARY OF EPA’S FOUR OBJECTIVES:

Objective #1: Adapt EPA’s policy, regulatory and compliance framework to promote innovation.

Objective #2: Strengthen the capacity of technology developers and users to succeed in environmental technology innovation.

Objective #3: Strategically invest EPA funds in the development and commercialization of promising new technologies.

Objective #4: Accelerate the diffusion of innovative technologies at home and abroad.”

“EPA will actively establish and strengthen working partnerships with other federal, state and local agencies in striving to meet its technology objectives.”

“EPA and state environmental agencies need to become better partners with the private sector in helping to bring critical new technologies to commercialization and widespread use. For example, ... government agencies can help reduce risk for innovators in the environmental technology market by convening public-private partnerships that target, collaborate, ~~and~~ fund research and development of innovative technologies; by supporting their testing and demonstration so as to provide credible documentation of their performance; and by improving governmental policies. These efforts will be most effective if EPA and its state counterparts undertake them collaboratively.”

EPA Administrator Carol MBrowner:

“In every way that EPA intersects with industry — rulemaking, in permitting, in reporting requirements, in enforcement, in technical assistance — are we doing everything we can to meet our health and environmental goals in the most efficient and effective way? Are we providing the flexibility businesses need to meet our health and environmental goals in the way that works best for them? Are we doing everything we can to be cleaner and cheaper?”

Chart and Map

BRIEF HISTORY OF MAJOR U.S. ENVIRONMENTAL LAW

RIVERS AND HARBORS ACT - 1899: Its primary intent was to prohibit the disposal of solid objects into waterways that could create a hazard to navigation, but did not specifically address waste disposal as an issue in and of itself. It prohibited the creation of any object that could possibly interfere with the navigability of any United States waterway. Despite this Act, no significant regulatory actions were created during the first half of the twentieth century. At the beginning of this century industrial waste disposal was not believed to be a serious problem by either the private or public sectors.

ATOMIC ENERGY ACT - 1954: This Act was intended as a revision to the Atomic Energy Act of 1946. Its purpose was to provide for civilian participation in such programs as research and development and the production of nuclear power and to broaden the Atomic Energy Commission's power to include the regulation of all programs involving the use of atomic energy.

AIR POLLUTION CONTROL ACT - 1955: This Act required the US Public Health Service (PHS) to carry out extensive research and to assist the states and local communities in the control of air pollution. It was the first real attempt in the US to address the problem nationally. It is viewed as the Clean Air Act's predecessor.

CLEAN AIR ACT (1) - 1963: This Act enlarged the duties of the PHS by providing for an accelerated research and training program; established a program of matching grants to state and local agencies that initiate their own air pollution control mandates; and provided for the development of specific air quality criteria.

CLEAN AIR ACT (2) - 1967: This Act required the PHS to study the cause and effect aspects and designate those pollutants considered to be of major concern. After the study, Criteria Documents were to be issued on individual pollutants citing actual levels of concentration in ambient air at which point unfavorable effects would result; identify known methods for emission control; and study the regions within the US where common or uniform pollution control regulations should be established. The Act also required states to adopt air quality standards compatible with the PHS-established Criteria documents.

CLEAN AIR ACT (3) - 1970: The major focus of this revision was to transfer responsibility for the Clean Air Act's implementation to the new Environmental Protection Agency; this Act was amended again in 1990.

NATIONAL ENVIRONMENTAL POLICY ACT (NEPA) - 1970: President Richard Nixon signed into law the National Environmental Policy Act on January 1, 1970, and a decade of environmental legislation followed. The responsibility for implementing and coordinating NEPA was given to the Council on Environmental Quality, a new branch agency.

CLEAN WATER ACT (CWA): Established in 1972 with the passage of the Federal Water Pollution Control Act (FWPCA) Amendments. The CWA has been the subject of two major amendments - the Clean Water Amendments of 1977 and the Water Quality Act of 1987.

FEDERAL INSECTICIDE, FUNGICIDE AND RODENTICIDE ACT (FIFRA) - 1949: (substantially amended in 1972 and 1978) Not until the amendment of 1972 was the FIFRA perceived as a major source of environmental policy. FIFRA's purpose is to ensure that society reaps the benefits of pesticide application, with minimum risk to the environment and human health.

HAZARDOUS MATERIAL TRANSPORTATION ACT (HMTA) - 1957: HMTA is enforced by the US Department of Transportation and is intended to improve regulatory and enforcement activities by providing the Secretary of Transportation broad authority to set regulations applicable to all aspects concerning the transportation of hazardous materials.

TOXIC SUBSTANCES CONTROL ACT (TSCA) - 1976: This was an amendment to the Solid Waste Disposal Act (SWDA), and was subsequently amended in 1980 and 1984. It addresses the regulation of solid wastes (hazardous and nonhazardous) and, via the 1984 amendments, the regulation of underground storage tanks (UST).

COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION AND LIABILITIES ACT (CERCLA) - 1980: CERCLA is known as Superfund."

SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT (SARA) - 1986: SARA was an amendment to CERCLA, and presented new and challenging requirements to EPA with respect to implementation and enforcement of reporting requirements, and under Title III, to industry in terms of compliance.

HAZARDOUS WASTE OPERATIONS AND EMERGENCY RESPONSE (HAZWOPER) - 1980: It is designed to address qualification requirements and training for all personnel designated to handle or work with hazardous wastes during the normal course of work, and is enforced by the U.S. Department of Labor under OSHA.

POLLUTION PREVENTION ACT (PPA) - 1990: This legislation is designed to encourage industry to reduce the amount of hazardous waste generated during the manufacturing process. Several new provisions were contained that expanded the reporting requirements under SARA, Title III (Emergency Planning and Community Right-to-Know Act of 1986).

ADDITIONAL INFORMATION:

Until the 1950's the Rivers and Harbors Act was the only significant piece of legislation that addressed environmental pollution although the effect was indirect.

During the period of 1950 to 1970, air pollution was the primary focus of environmental policy development.

The Environmental Protection Agency (EPA) was created as an independent agency of the US government via an Executive Order entitled, "Reorganization Plan of 1970." The creation of EPA was accomplished by the Executive Branch of government instead of the legislative and thus is the exception to the normal process.

Other agencies of the federal government that are involved in national environmental policy formation include the US Department of Labor (DOL), the US Department of Transportation (DOT), the US Department of Energy (DOE), and the Occupational Safety and Health Administration (OSHA).

The Federal Administrative Procedures Act (APC) provides the rule-making framework that is generally applicable to all federal agencies. This includes two primary methods for rule making: formal and informal. Formal rule making, seldom practiced, is to be performed only if it is specifically required by Congress in the originating statute. Informal rule making, also known as "notice and comment," is the method primarily used. This method is initiated with the publication of a "general notice of proposed rule making" in the Federal Register, which is meant to provide interested parties an opportunity to participate in the process and to satisfy due process requirements. "Hybrid rule making" involves a mixture of both formal and informal rule making and applies directly to EPA.

The states have similar, if not exact, requirements that are implemented and enforced on the state level under authorization from the EPA, aside from the federal process of environmental regulation.

The "environmental audit" is an established method of verifying that compliance with certain regulatory requirements and company policies are fulfilled; it ensures that acceptable operating practices are in place, and is routinely applied to situations ranging in scope from a formal regulatory compliance review to the use of self-help questionnaires and surveys. Types of environmental audits include: the "environmental compliance audit," typically conducted to evaluate the adequacy of a facility's compliance with a particular set of regulations and to verify that appropriate compliance systems are in place and functioning properly; the "environmental liability audit" or "risk assessment audit," typically performed on an existing facility in an attempt to determine the particular level of liability and/or potential liabilities associated with the facility's current environmental status; a "waste disposal site audit," and a "consent audit," performed as a remedy for previously identified problem areas, and generally used as a result of some settlement negotiations or consent decree imposed by an environmental authority.

PERMITS NECESSARY FOR LANDFILLS IN CALIFORNIA

Local

Local Planning Departments

Operating Permits; different names for the same permit include:

Land Use Permit

Conditional Use Permit

Building Permit

Planned Development Permit

Regional

Regional Water Quality Control Board

Industrial Storm Water Permit

Waste Discharge Requirements (WDR)
Contaminated Soils--Special Wastes Permit

Bay Area Air Quality Management District

Dust

Engine emissions from stationary power generation engines

State

California Environmental Protection Agency

Department of Toxic Substance Control (DTSC)

Hazardous Waste Facility Permits

On-site treatment, storage or disposal of certain kinds of waste streams

Limited by volume, concentrations, etc.

Subtitle D, RCRA from EPA

Federal

U.S. Army Corps of Engineers

Wildlife Refuge, 404 Permits, Section 10 or 7

TECHNOLOGY CERTIFICATION IN CALIFORNIA

On January 3, 1993, Governor Wilson issued a joint mandate for creating the California Environmental Technology Partnership (CETP) to the California Environmental Protection Agency (Cal-EPA) and the Trade and Commerce Agency. The mission of this group is stated in Cal-EPA's Hazardous Waste Environmental Technologies Fact Sheet (October 1994) as one which is designed to:

"preserve and promote California's high environmental standards to pursue pollution prevention, and to recognize, assist and promote California-based companies that research, develop, produce, market and export environmental technologies, goods and services."

With the passage of AB 2060, Cal-EPA's Department of Toxic Substances Control (DTSC) has been authorized to establish a Technology Certification Program to meet the challenges posed by this mission. The Technology Certification Program was instituted by DTSC in January, 1994 and seven environmental technologies have been certified to date. The two technology certification types currently available include: Regulatory Certification and Performance Certification. Regulatory Certification allows for certification of suitability for Conditional Exemption, Conditional Authorization and Certification Under Permit-by-Rule for hazardous waste treatment technologies. Performance Certification allows for state evaluation and certification of the efficacy and efficiency of a technology's performance.

Although not a regulatory requirement, Technology Certification is one of the options currently available to technology companies who wish to add credibility to the pollution prevention capabilities of their product. Blue teams will be given the option of choosing Technology Certification as one of several regulatory authorization options.

Appendix J: Glossary of Terms

ARPA	Advanced Research Project Agency
ATP	Advanced Technology Program
BABCO	Bay Area Battery Company; Blue Team 2
BACT	Best Available Control Technology
BAD	Biologically Accelerated Decomposition - a patented process for rapid conversion of waste to harmless byproducts
CARB	California Air Resources Board
CFCs	Chlorofluorocarbons
CRADA	Cooperative Research and Development Agreement
CAST	Citizens Against Suspicious Technologies
CEJ	Californians for Environmental Justice
CUTS	Clean Up The Soil; Blue Team 4; a partnership between Behemoth Engine Co. and Electra Technologies
DOC	Department of Commerce
DoD	Department of Defense
DOE	Department of Energy
DTSC	Department of Toxic Substances Control
EPA	Environmental Protection Agency
ET	Electra Technologies
GMC	Gary Motors Corporation
LCA	Life Cycle Assessment
leachate	A solution resulting from dissolving soluble constituents from soil, landfill, etc. by downward percolating ground water.
NSF	National Science Foundation
putrescibles	Organic materials in a state of decay (like rotten banana peels)
RCRA	Resource Conservation and Recovery Act (1976)
R&D	Research and Development
Restore	Modern landfill company; Blue Team 1
ROCAR	Remove Organic Compounds At Refineries; Blue Team 3; a joint venture between Big Oil Co. and Clohi
SBIR	Small Business Innovation Research
SVOC	Semi-Volatile Organic Compound
STTR	Small Business Technology Transfer
TCE	Trichloroethylene
TRP	ARPA Technology Reinvestment Project
USABC	United States Advanced Battery Consortium
VOC	Volatile Organic Compound